

# Review of Environmental Factors

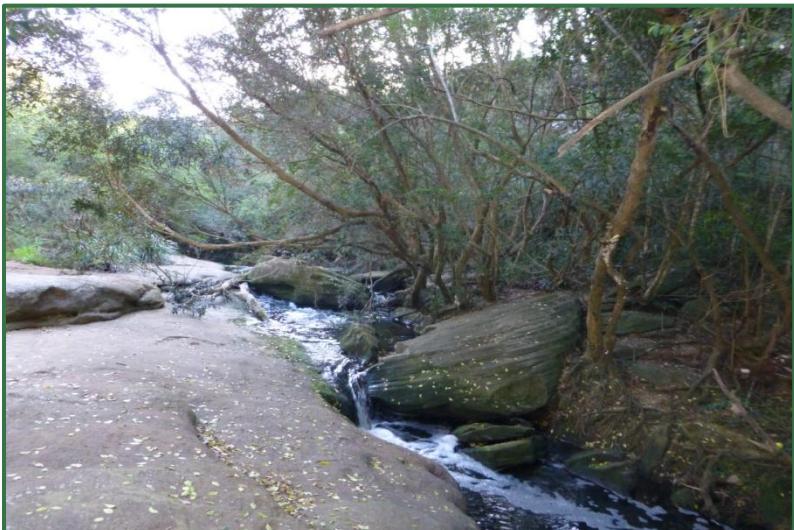
*for a Proposed Cycleway Link in  
the Cattai Creek Riparian Corridor,  
Linksley Avenue Glenhaven to  
Rosebery Road, Kellyville*

*Prepared for  
The Hills Shire Council*

**28 September 2012**



*Prepared by  
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## Declaration and Sign Off

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I, Judith Rawling Managing Director of UBM Ecological Consultants Pty Ltd hereby state that the **Review of Environmental Factors for a Proposed Cycleway Link in the Cattai Creek Riparian Corridor between Linksley Avenue Glenhaven and Rosebery Road at Kellyville** has been prepared in accordance with The Hills Shire Council's Policies and Instructions relating to the protection of the environment and its environmental due diligence responsibilities.

The UBM project team members charged with preparing the REF were:

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Managing Director  
UBM Ecological Consultants Pty Ltd

28 September 2012



## Executive Summary

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### **Background:**

THSC is developing a system of Cycleways within the Hills Shire. This is an on-going project, and the current Cycleway Proposal is among a number of such Proposals planned for the Shire over the next several years. The proposed Cycleway Links join into a number of existing tracks and pathways, and are expected to combine concrete pathway construction with reinforced wooden boardwalks.

UBM Ecological Consultants Pty Ltd has been commissioned by The Hills Shire Council to carry out a Review of Environmental Factors associated with the construction of a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road at Kellyville. The route of the proposed Cycleway Link travels along the valley of an unnamed tributary creek which flows from the east, then joins into Cattai Creek in Fullers Road Reserve – together described as ‘the Cattai Creek Riparian Corridor’. This Cycleway route is part of the Regional Recreational Trails Framework from the NSW Department of Planning.

Following site survey and assessment of the ecological resources of the Cattai Creek Riparian Corridor (*Flora and Fauna Investigations for the Cattai Creek Riparian Corridor*, UBM September 2012), Council has determined the most appropriate locations for the Cycleway Link, given the safety issues associated with local geology and topography, shared use of the Cycleway Link by cyclists and pedestrians, and the availability of existing fire trails and tracks suitable for use by cyclists.

The main impacts of the proposed works, as identified in this document, relate to possible damage to natural geological features and to native vegetation (bushland), and (in some sites) the potential for existing weed populations to spread. Disturbance to creekbanks (e.g. soil erosion, slippage and sedimentation) may arise if the Cycleway is sited too close to the creeks. The total length of the route surveyed for this REF (Sections 1 to 3 only) was ~1,910 linear metres, with 2-3 metres on each side of the existing track network assessed (~ one [1] hectare<sup>+</sup> in area).

### **Flora:**

Given the proposed Cycleway will utilise a network of existing (unmade) bush tracks and a paved fire trail, it is considered that the majority of this Cycleway Link can be constructed without impacting significantly on the native bushland; being predominantly Sandstone Riparian Scrub and Hinterland Sandstone Transition Woodland. Neither plant community is currently listed under the threatened species legislation.

However, a small stand of Sydney Turpentine Ironbark Forest (‘STIF’) – a plant community listed as ‘threatened’ under the NSW *Threatened Species Conservation Act 1995* and as ‘critically endangered’ under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* occurs at the south-eastern end of the Cycleway route, near Linksley Avenue and Timber Grove at Glenhaven.

As this stand occurs on the upper slopes of the valley and is already traversed by a bush track, this plant community is unlikely to be further impacted by the upgrading of the existing track. Under the precautionary principle, an Assessment of Significance (the Seven-part Test) has been undertaken for the STIF community, with no significant impact being determined (see *Appendix C*).



Two (2) naturally-occurring threatened flora species also occur: *Darwinia biflora* and *Epacris purpurascens* var. *purpurascens*. Both species occur in bushland close to the existing bush track and fire trail. Seven-part Tests have been undertaken to assess the potential impacts of the Cycleway construction on the two (2) threatened species. These Assessments have concluded that provided that care is taken during construction, impacts on these threatened species are unlikely to occur.

A third threatened species *Syzygium paniculatum* (Brush Cherry) also occurs in one (1) location, although this specimen is believed to be a horticultural planting or garden escape. This specimen is located behind private property upslope of the existing bush track. No Seven-part Test has been prepared.

#### **Fauna:**

Two (2) species, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Little Lorikeet (*Glossopsitta pusilla*) - both listed as 'vulnerable' under the *TSC Act*) - were identified in the Study Area. It is also possible that other threatened fauna species recorded for the Region would utilise the resources of the Study Area or neighbouring properties on occasion for foraging, hunting, nesting or roosting.

Under the precautionary principle, a Seven-part Test of Significance (see *Appendix D*) for each of the following species was undertaken to consider the impacts of the construction of the cycleway from Linksley Avenue to Rosebery Road:

- Little Lorikeet (*Glossopsitta pusilla*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Powerful Owl (*Ninox strenua*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)

These Assessments have concluded that provided that the recommendations made in this REF are followed, the Cycleway Link construction will result in no significant impact on the threatened fauna species considered likely to occur, or which may use the resources of the Study Area on occasion.

This opinion has been based on the assumption that no native canopy trees will be removed, all habitat trees will be protected, and that the Cycleway Link will follow the 'line of best fit', avoiding mature trees and geological features wherever possible. It is stressed that a large number of 'habitat trees' occur in Section 3 (Chainmail Crescent to Cattai Creek and to Rosebery Road).

#### **Geology:**

The route from Citadel Crescent to Cattai Creek and upslope to Rosebery Road (Section 3) will involve some damage to geological features as the track will need to be widened to accommodate the Cycleway. The existing tracks are only about one (1) metre wide, or less, and they generally skirt around large rock outcrops. Some of the rocks near the top of the escarpment below Rosebery Road



are very high and difficult to climb. Recommendations to avoid damage to geological features are provided in the REF (realignment, boardwalks etc).

#### **Air Pollution:**

Dust emissions from vehicles during ingress and egress are likely during construction works. However, the works will be short-term, and it is not anticipated that construction of the Cycleway Link and any associated landscape work post construction will create any air quality problems. The impact of dust on air quality can be minimised if appropriate management actions are undertaken.

Within the Study Area, no constraints relating to air quality were identified that would prevent the construction of the proposed Cycleway Link.

#### **Water Quality:**

Potential impacts on water quality and local drainage include movement of newly installed fill and other stockpiled material (if uncontained) into local creeks, particularly during periods of heavy rain. This is likely to result in sedimentation and an increase in turbidity.

Several of the concreted drainage swales crossing the fire trail behind Ridgecrop Avenue and stormwater outlets from nearby residential streets contained large amounts of rubbish, and outlets were generally surrounded by weeds. Debris is then washed down into the creek waters and transported downstream into the creeks. Water quality in Cattai Creek was considered to be 'poor' at the time of site survey. Note that the Sydney Water Pollution Control Plant is located *upstream* of the proposed creek crossing.

Safeguards to protect (and improve) water quality have been proposed in this REF. These include attention to stormwater outlets and erosion points along the existing bush tracks and fire trail. Water quality testing on Cattai Creek in the vicinity of the 'swimming hole' is strongly advised, especially if the public encouraged to come down to the Creek for passive recreational usage.

#### **Noise Pollution:**

The fire trail behind Ridgecrop Drive and bush tracks elsewhere in the Study Area are contained within a narrow, steep-sided valley, with houses on the ridgetops. Any noise generated currently would arise from vehicles using local roads, and from landowners carrying out routine maintenance activities (lawn mowers, whipper snippers etc); mainly on weekends.

As motorbikes and mini-bikes are banned from using the Ridgecrop Drive fire trail, any noise arising from cyclists and/or pedestrians using the new Cycleway Link will be minimal and is unlikely to disturb nearby residents.

There are currently no significant noise issues or impacts for any part of the Study Area; however any loud noise generated as the result of construction work (e.g. machinery, rock blasting etc), especially in Section 3 where a bridge over Cattai Creek is proposed, is likely to 'echo' throughout the valley and disturb local residents. However, it is envisaged that this work will be short term.



### ***Recreational Amenity***

There are no formal active recreational facilities located in the Study Area. A network of bush tracks and trails follows the banks of Cattai Creek and its unnamed eastern tributary, with a number of 'cross over' points available to walkers. These tracks and fire trails are used by pedestrians, dog walkers and cyclists.

Once the Cycleway Link is completed, it is envisaged that there will be an increase in track usage, although safeguards will have to be applied to ensure that motorbikes and mini-bikes (currently banned from the fire trail network) do not begin to use the Cycleway more intensively, thereby increasing noise levels, and generally posing a risk to public safety.

### ***Heritage:***

There are no (0) known items of Aboriginal or European heritage known for the Study Area. Based on the results of the literature search and database review, it is considered that the Cycleway Link Proposal can proceed as planned, as long as the recommendations set out in this REF are implemented.

### ***Summary:***

On the basis of the information provided, it is concluded that, by adopting the safeguards and measures identified in this Review of Environmental Factors there will be no significant environmental impacts as a result of undertaking the proposed Cycleway Link in the Cattai Creek Riparian Corridor.



## Definition of Terms

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**EEC** - Endangered Ecological Community – as determined by the NSW Scientific Committee and listed under State and/or Commonwealth legislation and described as a community facing a high risk of extinction in the immediate future unless management strategies are implemented.

**Characteristic vs. Diagnostic Species** - Characteristic species are those typically found in the plant community. Diagnostic species are those that indicate the type of plant community present. An example might be Blue Gums indicating BGHF, Grey Box indicating Cumberland Plain Woodland or Shale Gravel Transition Forest. Some commonly occurring species are characteristic of quite a few plant communities, e.g. *Pittosporum undulatum*, *Microlaena stipoides*, *Pratia purpurascens*, *Dichondra repens* etc.

**DECCW** – NSW Department of Environment, Climate Change and Water (formerly ‘DECC’). Now the Office of Environment & Heritage (‘OEH’) within the Department of Premier & Cabinet.

**Direct Impacts** are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat.

**Indirect Impacts** occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas.

**Ecological Community** – described as an *assemblage of species* occupying a particular area at a particular time, e.g. as set out in the Final Determinations of the Scientific Committee

**EPBC Act** – Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*

**Habitat** – an area or areas occupied, or periodically or occasionally occupied by a species, population or ecological community, and including any biotic or abiotic components present.

**HSGF** – Hinterland Sandstone Gully Forest, a vegetation community widespread in the Locality and Region and not listed under the environmental legislation.

**LGA** – Local Government Area – here The Hills Shire

**Locality** – generally, an area within 1-2 kilometres of the Study Area

**NPWS** – former National Parks & Wildlife Unit of DECCW



**SCIVI** – *Southeast NSW Native Vegetation Classification and Mapping* by Tozer *et al.* (2006/2010) for the former Department of Environment and Climate Change (DECCW)<sup>1</sup>.

**SRS** – Sandstone Riparian Scrub, an ecological community considered to be adequately conserved in the Sydney Bioregion

**STIF** - Sydney Turpentine Ironbark Forest, an ecological community considered to be 'Endangered' under the NSW *Threatened Species Conservation Act 1995*, and 'Critically Endangered' under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

**Study Area** - bushland on the slopes of Cattai Creek and its eastern unnamed tributary; approximately 1910 metres in length and 2-3 metres wide (where access was possible, located both upslope and downslope of the existing foot track and fire trail –i.e. the area proposed as the new Cycleway Link (total area 1 ha<sup>+</sup>)

**THSC** – The Hills Shire Council

**TSC Act** – NSW *Threatened Species Conservation Act 1995*

**UBM** – UBM Ecological Consultants Pty Ltd: formerly trading as Urban Bushland Management Consultants ('UBMC')

**WoNS** – Weed of National Significance

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<sup>1</sup> **Reference:** Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2010). Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tableland, in *Cunninghamia* 11 (3)



## 1 INTRODUCTION

### 1.1 Background Information

THSC is currently developing a system of cycleways within The Hills Shire, called the *Baulkham Hills Council Bikeplan - Kellyville Network*. The Bikeplan is being developed as part of *Development Control Plan 2000 - the Kellyville/Rouse Hill Forward Plan*. Construction of the cycleways is an on-going project, and the Cycleway Link that forms the subject of this REF is among a number of similar projects to be undertaken progressively in The Shire areas over the next several years.

Cycleway Links are determined given the safety issues associated with topography, shared use of the Cycleway by pedestrians and cyclists, the availability of existing pathways through areas of remnant native bushland, and the need to strategically link residential and business areas through a number of transport options.

UBM Ecological Consultants ('UBM') Pty Ltd has been commissioned by The Hills Shire Council ('THSC') to carry out a **Review of Environmental Factors** ('the REF') associated with the construction of a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road in Kellyville. This Cycleway route is part of the Regional Recreational Trails Framework from the NSW Department of Planning.

Following detailed site survey and assessment undertaken by UBM in September 2012 (*Flora & Fauna Surveys in support of a Proposed Cycleway Link in the Cattai Creek Riparian Corridor*), THSC has determined an appropriate route for the new Cycleway Link, with the preferred route utilising existing bush tracks, a paved fire trail, and cleared land. In determining the Cycleway route at the western end of the Corridor (Cattai Creek to Rosebery Road), a number of options were considered to allow the Cycleway is to connect up with an existing Link on Rosebery Road.

A large part of the proposed Cycleway Link is located in the valley of an unnamed eastern tributary of Cattai Creek, which joins into Cattai Creek to the north of Chainmail Crescent. Both waterways flow through steep-sided valleys with good quality native bushland on the valley slopes and established residential development on the ridgetops. Cattai Creek forms the boundary between the suburbs of Glenhaven (north-east), Castle Hill (south-west) and Kellyville (west) (see *Figure 1.1*).

For the purposes of this Report, together the valleys of these two (2) watercourses will hereafter be described as the **Cattai Creek Riparian Corridor**.

The **Study Area** addressed by this REF is located in the Cattai Creek Riparian Corridor between Linksley Avenue and Timber Grove (south-east) and Rosebery Road (north-west). The total length of the route surveyed for this REF (Sections 1 to 3 only) was ~1,910 linear metres.

*Figure 1.1* provides an overview of the existing and proposed Cycleway Links in this part of the Shire.



Figure 1.1: Overview of Proposed Cycleway Links (THSC)





## 1.2 Scope of Works for the Review of Environmental Factors

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This REF is an assessment of the potential environmental impacts associated with the Proposal to construct a Cycleway Link in the Riparian Corridor of Cattai Creek between Linksley Avenue Glenhaven and Rosebery Road at Kellyville.

The REF has been prepared to identify the significance of any adverse environmental impacts that could arise from the works and to determine whether or not there is a need for further assessment through an *Environmental Impact Statement* ('EIS').

Additionally, for projects not requiring further assessment in the form of an EIS, the REF identifies the measures that need to be implemented to avoid or minimise any potential environmental impacts that may be associated with the works.

As specified in the Project Brief and the NSW Planning Guidelines for the preparation of an REF, a number of surveys and other investigations were reviewed, including:

- A review of State and Commonwealth Acts, Policies and other relevant legislation;
- A review of local planning controls and regulatory approval processes for The Hills Shire Council, including the current (2005) and draft (2010) LEPs and relevant DCPs;
- Accessing of previous reports, flora and fauna surveys, and Council internal documents relevant to the ecology of native vegetation communities, local flora and fauna, and geological and historical/cultural attributes of this section of The Hills LGA;
- Searches of NPWS flora, fauna and ecological communities databases, including register of Aboriginal sites ('AHIMS'), and
- Field surveys of the bushland and riparian zones to search for threatened flora, fauna, ecological communities and noxious weeds (Flora and Fauna Survey, UBM September 2012).

The objectives of the current Technical Investigations were to:

- Describe the sites of the proposed works (the construction of the Cycleway Link) in terms of their biophysical, socio-cultural, land tenure and land use settings;
- Describe existing conditions in relation to a range of characteristics addressing in turn each component of the existing environment;
- Describe each component in terms of any potential impact of the proposed works;
- Identify environmentally sensitive areas (i.e. supporting fire-sensitive species, threatened species and/or habitats);
- Identify environmental impacts relating to flora, fauna, ecological communities and their habitats, heritage items (European and Aboriginal), hydrological patterns and water quality including potential changes in aquatic habitats, and likelihood of erosion and sedimentation of watercourses, geology and soils, and if appropriate, impacts on the social environment, such as noise and traffic, air pollution, visual amenity and recreational uses;



- Prepare a list of safeguards, and where appropriate, recommend practical alternatives to protect ecological assets;
- Provide a range of measures and options designed to ameliorate any potential impacts to the ecological and human environment; and
- Identify key stakeholders and (if appropriate) any community groups with a special interest.

## 1.3 SITE DEFINITION

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### 1.3.1 Location and Setting

The proposed route of the Cycleway Link in the Cattai Creek Riparian Corridor utilises an existing bush track between Linksley Avenue close to its intersection with Timber Grove and Citadel Crescent (hereafter '**Section 1**') (see *Figure 1.2*).

The Cycleway then follows a wide paved fire trail which runs behind Ridgecrop Drive between Citadel Crescent to Chainmail Crescent and Arbor Glen ('**Section 2**') (see *Figure 1.2*).

The third section of the Cycleway Link enters bushland from the grassed verge on Chainmail Crescent, follows a narrow bush track downslope, and using a circuitous route ends up at Cattai Creek directly below Rosebery Road ('**Section 3**'). The proposed Cycleway route will cross over the creek (via a new bridge) and climbs up the steep embankment below Rosebery Road, although it is not known how Cycleway construction will address passage up and over the sandstone escarpment (see *Figure 1.2*).

For the purposes of providing an optional route to Section 3, an additional section of track was surveyed between Chainmail Crescent and the Sydney Water's Water Pollution Control Plant, crossing over Cattai Creek via an existing bridge near the end of Wrights Road at Kellyville (**Section 4**)<sup>2</sup> (see *Figure 1.2*).

The total length of the route surveyed for this REF (Sections 1 to 3 only) was ~1,910 linear metres. See *Figure 1.2* for the location of Sections 1 – 4 of the proposed Cycleway Link.

Residential land in Glenhaven (north-east) and Kellyville (west) is located on both sides of the Cattai Creek Riparian Corridor, with properties on the ridges backing onto the proposed Cycleway Link for the length of the Study Area.

A sewer line easement is located on the south side of the tributary valley, generally sited close to the existing bush track with a number of pipes traversing to the opposite side of the gully (see *Figure 1.2 and Plates*). The unmade bush track from Linksley Avenue appears to have been formed over this easement, which has been backfilled with rocks to create a rough walking track. A large sewer main is located in the gully close to the northern end of the Study Area, with the Water Pollution Control Plant located on Cattai Creek at the eastern end of Wrights Road (ex-Study Area). An electricity easement crosses over Cattai Creek between Citadel Crescent and Rosebery Road.

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<sup>2</sup> Section 4 has been abandoned on the advice of THSC which advised that it is not suited to purpose.

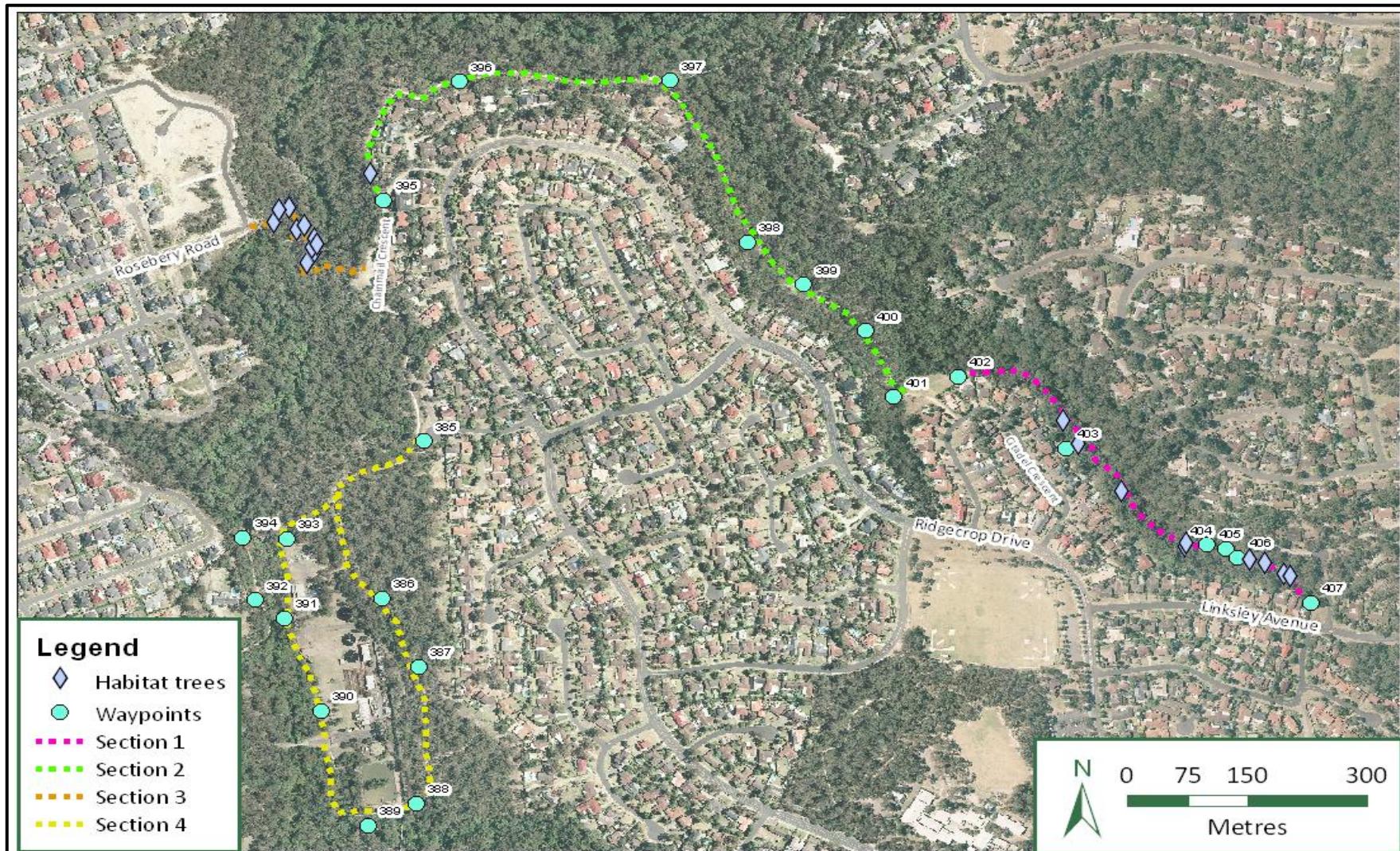


**Table 1.1: Summary of Legal Description**

<b>TITLE INFORMATION</b>	Cattai Creek Riparian Corridor between Linksley Avenue Glenhaven and Rosebery Road Kellyville
<b>TOTAL AREA</b>	Study Area ~ 1910 linear metres, 2-3 metres width on each side of the existing tracks and fire trail.
<b>CO-ORDINATES/ELEVATION</b>	-33.707253 S centroid, 150.988473 E centroid
<b>TOPOGRAPHIC MAP</b>	Riverstone 1: 25 000
<b>OWNERSHIP</b>	Land within the Study Area is owned by THSC. Residential development abuts on both sides of the gullies
<b>LOCAL GOVERNMENT AREA</b>	The Hills Shire
<b>CATCHMENT</b>	Cattai Creek sub-catchment: part of the Greater Hawkesbury-Nepean Catchment
<b>ZONING (HILLS draft LEP 2010</b>	RU-1 Public Open Space (formerly 6(a) Open Space/ Community Land
<b>CURRENT LAND USE</b>	Native bushland/fire trail and sewer line emplacement



Figure 1.2: Site Details: Survey Route and Sections Surveyed





### 1.3.2 Land Uses and Zoning

Under *Baulkham Hills LEP 2005*, land in the Study Area was zoned 6(a) Open Space. Under *The Hills draft LEP 2010* the land will be zoned RU-1 Public Open Space –essentially the same land use.

Kellyville and nearby Glenhaven are residential suburbs in the North and West Wards of The Hills LGA. Local land uses in the vicinity of the Study Area are primarily suburban living; with native bushland retained in Creek Corridor and used for passive recreation). Several sporting fields are located in the Cattai Creek Riparian Corridor, but none are found within the current Study Area.

### 1.3.3 Services, Infrastructure and Facilities

There are no services or facilities in the Study Area other than the hard-paved fire trail which runs between Citadel and Chainmail Crescents. There are no lights and no directional signage in the eastern part of the Study Area (Linksley Avenue to Citadel Crescent).

There are several signs prohibiting the use of motorcycles and mini-bikes along the fire trail behind Ridgecrop Drive, and a single directional sign with a location map attached to a stone marker at the corner of Arbor Glen and Chainmail Crescent. A locked boom gate is located at Arbor Glen.

**Table1. 2: Summary of the Services, Infrastructure and Facilities**

Site Attributes	Description
<b>Walking Tracks/Parking</b>	No walking tracks or parking within the Study Area
<b>Lighting &amp; Solar Access</b>	No lighting or solar access within the Study Area
<b>Signage</b>	There are several signs prohibiting the use of motorcycles and mini-bikes along the fire trail behind Ridgecrop Drive, and a single direction sign with a map at the corner of Arbor Glen and Chainmail Crescent.
<b>Fencing</b>	Private property fences are located to the rear of all residences backing onto the Study Area. A locked boom gate is located at the northern end of the fire trail at Arbor Glen. The SWC Water Pollution Plant at the end of Wrights Road is fenced.
<b>Recreational Facilities</b>	No recreational facilities are located within the Study Area
<b>Services</b>	A sewer line easement runs along the western side of the unnamed eastern tributary creek. The easement crosses over to the eastern side of the creek at several locations. The bush track from Linksley Avenue to Citadel Crescent has been created over this easement. Sewer lines (manholes) are located along the bush track. Electricity lines cross from Citadel Crescent to Rosebery Road. There are no other services along the route of the Cycleway Link.
<b>Management Context</b>	Crown land under the care and control of THSC (zoned RU-1 Public Open Space). Private landholdings are located on both sides of the creek corridor and valley. Current bushland management practice is not known. Fire trail and drainage easements maintained by THSC.



## 1.4 PROJECT DESCRIPTION

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### 1.4.1 Overview and Justification

The THSC *Bikeplan* (2000) aims to link existing and future cycleway routes as part of an on-going strategy to provide a local network of cycleways in The Hills Shire. The *Bikeplan* will provide cyclists with safe and attractive alternatives to using roads and road shoulders.

Cycleways are a necessary transport infrastructure to provide alternatives to driving and walking, to promote personal fitness, and to reduce noise and emissions. THSC's policy is to develop cycle paths throughout the Kellyville and Rouse Hill areas, as outlined in the *Kellyville/Rouse Hill Forward Plan*.

The proposed Cycleway in the Cattai Creek Riparian Corridor between Linksley Avenue Glenhaven and Rosebery Road at Kellyville is another Link in the network of cycleways and walking trails along local watercourses in the suburbs of Kellyville, Glenhaven, Castle Hill and Rouse Hill. The proposed Cycleway Link (the focus of this REF) is part of the Regional Recreational Trails Framework (NSW Planning).

### 1.4.2 Proposed Works

Cycleways Links have wherever possible, been designed to utilise existing tracks, pathways and fire trails, and they strive to combine concrete pathway construction with reinforced wooden boardwalks (as required). Land in the Cattai Creek Riparian Corridor is owned by THSC, and the land is managed for conservation (zoned RU-1 Public Open Space). The total length of the route surveyed for this REF (Sections 1 to 3 only) was ~1,910 linear metres.

The works area for the construction of most Cycleway Links is estimated to require a maximum width of three (3) metres, although this may be narrowed to 2.5 metres where space is limited or other constraints apply. The works will require an excavation depth of about 100mm. Where necessary, vegetation will be cleared and topsoil will be excavated to a depth of 100 mm. Then 65 ml bar chairs will be set in place to support a F62 grade Reno frame, which will then be covered with concrete. Where necessary, boardwalks will be constructed to avoid significant ecological damage.

The Cycleway Link route will follow the 'line of best fit'; avoiding large trees and groups of younger trees wherever possible. Geological features will also be protected. Overhanging branches less than two (2) metres in height will be lopped for public safety reasons.

#### Section 1 - Linksley Avenue/Timber Grove to Citadel Crescent.

The proposed Cycleway route in Section 1 will follow an unmade bush track on the southern side of the unnamed eastern tributary. This track, although uneven and rocky, is used by pedestrians and cyclists. Constraints in Section 1 include steep topography (in part), narrow 'pinch-points', geological features (rock outcrops), and large trees next to the track. A number of habitat trees are located within a few metres of the bush track (see *Figure 1.2*).

The presence of a threatened species *Epacris purpurascens* var. *purpurascens* close to the edge of the bush track will also provide a constraint, and protective measures must be set in place prior to construction (see *Figure 3.3* for the location of *Epacris purpurascens* var. *purpurascens*).



Consideration may be given to the construction of boardwalks in some locations in order to avoid damage to the environment (geological features, trees and tree routes).

#### **Section 2 - Fire Trail behind Ridgecrop Drive: Citadel Crescent to Chainmail Crescent.**

The Cycleway Link will follow the existing broad fire trail which is 3 to 4 metres wide and paved with decomposed granite. There are one or two sites where some levelling of bumps and attention to erosion points will be required; otherwise the fire trail will remain in its present condition and will not be repaved with concrete (A. King, THSC pers. comm.). The combined fire trail and cycleway ends at Arbor Glen, but resumes a short distance away, running south behind Drawbridge Place. A wide grassed verge is available for parking on one side of Chainmail Crescent (see *Plates*).

An ecological constraint is provided by the presence of large population of about 50 individuals of the threatened shrub *Darwinia biflora* (see *Figure 3.2*). However, this population is located in bushland to the south-western side of the fire trail, and being at some distance away, it is unlikely to be impacted by the Cycleway Link.

There were no other ecological constraints observed in Section 2.

#### **Section 3 –Chainmail Crescent to Rosebery Road (Proposed Route)**

An unmade bush track leaves the grassed road verge on Chainmail Crescent, but then the proposed Cycleway route turns downslope towards Cattai Creek, taking a circuitous route downhill over rocky outcrops and ends at the toe of a very steep embankment below Rosebery Road (see *Figure 1.2*).

It is at this point that a bridge across Cattai Creek will be needed to allow the Cycleway to link up to the existing Cycleway on Rosebery Road. The steep slopes, large rock outcrops, the need to clear native vegetation to widen the bush track, and the need for a bridge across Cattai Creek will provide some constraints to construction on this part of the Cycleway Link.

The route of the Cycleway Link between Cattai Creek and Rosebery Road will have to scale a steep slope with large rock outcrops, especially toward the top of the escarpment. It is not known at this time exactly where the final route to Rosebery Road will be.

**NOTE:** the original route proposed left the Chainmail Crescent fire trail some 60 metres short of the new downhill bush track. It traversed undisturbed bushland on the steep slopes below Chainmail Crescent, but the creek crossing to Rosebery Road at this point will require a high level bridge.

The recommended Cycleway route (see *Figure 1.2*) represents the most probable route based on ecological, practical and economic considerations and has been established with input from UBM and from Council staff.



### 1.4.3 Proposed Activities

The Cycleway in the Cattai Creek Riparian Corridor will be used by both cyclists and pedestrians. Motorcycles and minibikes will continue to be excluded.

The fire trail running behind Ridgecrop Drive provides access for fire fighting vehicles during emergencies, although it is assumed that the narrow new Cycleway from Citadel Crescent to Linksley Road will not be suitable for fire fighting vehicles. Similarly, in their current state, the tracks from Chainmail Crescent to either Rosebery Road and/or Wrights Road are not suitable as fire trails.

### 1.4.4 Evaluation of Alternatives

Where there are physical or ecological constraints, alternative routes for Cycleways Links may need to utilise road shoulders or footpaths, but these options present safety and amenity issues. The preferred option will locate the Cycleway so as to allow existing pathways, fire trails, bridges and culverts to be utilised, requiring minimal disturbance to soils, creeks and vegetation, and vastly reducing planning and construction costs.

In preparing this REF, alternative routes have been considered for that section of the Cycleway Link which ends at Chainmail Crescent and proposed to continue on to Rosebery Road on the western side of Cattai Creek. When compared with other alternatives, the undertaking of the selected options not only performed best against the principles of ecologically sustainable development, but also had minimal social, environmental and financial costs.

#### ***Do Nothing***

If this Cycleway Link is not constructed, there will be a wide ‘gap’ in the cycleway network which currently runs along local waterways in this part of The Hills Shire. The proposed Cycleway Network is shown on *Figure 1.2*.

Section 1 of the route, the bush track from to Linksley Avenue and Timber Grove to the grassed fire break behind Citadel Close will continue to be available to pedestrians and mountain bike users, but in order to avoid this part of the route, other cyclists using less robust ‘road bicycles’ will be forced onto nearby roadways or risk using the narrow track, which is uneven and subject to erosion.

In Section 3 of the route (Chainmail Crescent to Rosebery Road) the steep circuitous route down the slopes to Cattai Creek, and the lack of a bridge across Cattai Creek will force users to undertaken a significant detour over similarly rough bush tracks to the creek crossing at the end of Wrights Road (near the Water Pollution Control Plant).

#### ***Option 1***

Construct the Cycleway Link as proposed (*Figure 1.2*). Upgrade the bush track and existing fire trail through Sections 1 and 2. Construct a high level bridge from the end of the fire trail at Chainmail Crescent across to Rosebery Road on the far side of the Cattai Creek gully. Bridge construction will be expensive, require major construction work, clearing of native vegetation, and will impact significantly on ecological values.



### ***Option 2***

Construct the Cycleway Link as proposed (*Figure 1.2*), through Section 1 and 2. Rather than crossing over to Rosebery Road down the steep slope at Chainmail Crescent, consider an alternative route and creek crossing a short distance downstream (see *Plates*). This alternative route, although circuitous and slightly longer, will bring the Cycleway Link to a relatively flat area on the Creek. Although a bridge across the Creek will still have to be constructed and the escarpment below Rosebery Road bypassed or otherwise bridged.

### ***Preferred Option***

Despite the extra distance involved, and the need to upgrade and widen the existing bush track and clear native vegetation, Option 2 is likely to be considerably cheaper than building a high level bridge across Cattai Creek at Rosebery Road (Option 1). Without the need to navigate through undisturbed bushland (as originally proposed at Chainmail Crescent), Option 2 will have less impact on the natural environment.

Further, there is a good opportunity to improve local biodiversity values and improve visual amenity by removing weeds where the route crosses Cattai Creek. Repairing erosion points along the fire trail and clearing degraded drainage swales and stormwater outlets will improve public amenity. These actions would ideally be undertaken as parts of the Cycleway construction works.



## 1.5 STATUTORY REQUIREMENTS

A summary of the local planning policies, State and Commonwealth government legislation as they apply to the Cattai Creek Riparian Corridor is provided in *Table 1.3*.

**Table 1.3: Summary of Policies, Local Planning & Legislative Requirements**

GOVERNMENT LEVEL	RELEVANT POLICY/LEGISLATION	RELEVANCE TO STUDY AREA
Local	<i>Hills draft Local Environment Plan 2010</i>	The Cycleway Proposal must comply with zoning provisions of the LEP. Land in the Study Area is zoned RU-1 Public Open Space (formerly 6(a) Open Space/Community Land
	<i>Baulkham Hills Shire Development Control Plan 2007</i>	Land within the Cattai Creek Riparian Corridor is owned and managed by THSC.
	<i>BHSC Biodiversity Strategy May 2006</i>	Land set aside for open space use has been selected on the basis of its suitability for play facilities and the proposed recreation facilities set out in BHSC's <i>Kellyville/Rouse Hill Open Space and Recreation Plan</i> .
Regional	<i>Regional Environmental Plan 20 – Hawkesbury/Nepean River Catchment</i>	The relevant DCP is the Kellyville/Rouse Hill Forward Plan and includes the ' <i>Baulkham Hills Council Bikeplan – Kellyville Network</i> ', under which the Cycleway Proposals have been formulated.
		Cattai Creek is a tributary of the Hawkesbury River and is included under the provisions of the <i>Hawkesbury/Nepean River Catchment Regional Environmental Plan ('REP 20')</i> .
		The purpose of this REP is to provide a regional context within which planning decisions can be made that will not result in further degradation of the river system.
		The Cycleway Proposal is required to take the objectives of REP 20 into consideration.
		One (1) small stand of an endangered ecological community ('EEC') listed under the <i>TSC Act</i> , Sydney Turpentine Ironbark Forest, was recorded in the Study Area (UBM 2012) (see <i>Appendix 5C</i> for Seven-part Test).
	<i>Threatened Species Conservation Act 1995</i>	<u>Flora</u> – two (2) threatened flora species occur – <i>Epacris purpurascens</i> var. <i>purpurascens</i> and <i>Darwinia biflora</i> (see <i>Appendix 5</i> for Seven-part Tests).
		<u>Fauna</u> – two (2) Vulnerable species were recorded: Eastern Bentwing-bat ( <i>Miniopterus schreibersii oceanensis</i> ) and Little Lorikeet ( <i>Glossopsitta pusilla</i> ).
		As suitable habitat is present for a number of threatened species, it is possible that other threatened fauna species may utilise the Study Area on occasion (UBM 2012)



GOVERNMENT LEVEL	RELEVANT POLICY/LEGISLATION	RELEVANCE TO STUDY AREA
	<i>State Environmental Planning Policy No 19 – Bushland in Urban Areas</i>	The requirements of SEPP-19 apply only to land zoned Public Open Space (6a). Bushland in the Subject Site is zoned RU-1 Open Space and is therefore subject to the requirements of SEPP-19.
	<i>Noxious Weeds Act 1993 (Amended 2005)</i>	A number of noxious weed species are recorded for the Study Area – being mainly woody weeds Privet and Lantana, herbs Pampas Grass, and vines/scramblers Bridal Creeper and Wandering Jew (see UBM September 2012)
	<i>State Environmental Planning Policy No 44 – Koala Habitat Protection</i>	Private landowners and THSC both have a legal responsibility to control <i>noxious plants and to prevent their spread to adjoining land</i> . Hawkesbury River County Council is the single purpose weed control authority charged with enforcement of the Act in its four (4) constituent councils, of which The Hills Shire is one such member.
	<i>Water Management Act 2000 (replacing the River and Foreshores Improvement Act 1948)</i>	THSC is <u>not</u> listed under Schedule 1 of SEPP-44. Therefore, despite the presence of koala feed trees in the Study Area and Locality, the requirements of the SEPP do not apply to land within The Hills Shire.
	<i>Rural Fires Act 1997 / Amendment 2002</i>	Construction undertaken within 40 metres of a waterway is designated as a 'controlled activity'* . Normally development would require a permit from the NSW Office of Water (HOW), (formerly Department of Water & Energy). However, as its own consent authority, THSC does <u>not</u> require a Permit to be issued by HOW, and approval for such developments lie within their legal structure.
		*Works which may obstruct, or detrimentally affect the flow
		Core Bushland in the Study Area is classified as Category 1 Bushfire Prone Land, with adjoining residential land classified as Vegetation Buffer 100 and 30 metres (Hills Bushfire Prone Lands Map Sheet 6, 2012)
Commonwealth	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	One (1) small stand of a 'critically endangered ecological community' ('CEEC') Sydney Turpentine Ironbark Forest was recorded in the Study Area <u>Flora</u> - no threatened flora species or populations listed under this Act were recorded (see UBM September 2012) <u>Fauna</u> - no threatened fauna were recorded, although suitable habitat is present for a number of threatened species (see UBM September 2012).



Other relevant NSW State government legislation includes:

- *Crown Lands Act 1989;*
- *Rural Fires Act 1997, Amendment 2005*
- *Heritage Act 1977;*
- *National Parks and Wildlife Act 1974;*
- *Roads Act 1993;*
- *Soil Conservation Act 1938;*
- *Rural Lands Protection Act 1998;*
- *Pesticides Act 1999 & Regulation 1999*
- *Occupational Health & Safety Act 1983;*
- *Waste Minimisation and Management Act 1995;*
- *Protection of the Environment Administration Act 1991;*
- *Protection of the Environment Operations Act 1997; and*
- *Water Management Act 2000.*



## 1.6 Principles of Ecologically Sustainable Development

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THSC must conduct its operations in accordance with the **Principles of Ecologically Sustainable Development** ('ESD'). The four (4) principles of ESD, outlined in s. 6(2) of the *Protection of the Environment Administration Act 1991* and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

*Precautionary Principle*: under this Principle, a Seven-part test (under Part 1, S5a of the *EP&A Act 1979*) has been carried out to assess the impacts of the Cycleway Proposal on the i) the EEC Sydney Turpentine Ironbark Forest and ii) two (2) threatened flora species *Epacris purpurascens* var. *purpurascens* and *Darwinia biflora* (see *Appendix C*).

Two (2) fauna species, Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Little Lorikeet (*Glossopsitta pusilla*) listed as 'Vulnerable' under the *TSC Act* were recorded for the Study Area. Seven part Tests have been undertaken for those species recorded, and other species considered likely to utilise the resources of the Study Area on occasion (see *Appendix D*).

In general, the Proposal to construct a Cycleway Link in the Cattai Creek Riparian Corridor is part of an environmentally beneficial and sustainable transport strategy, and delays to the project should be avoided. This Cycleway route is part of the Regional Recreational Trails Framework from the NSW Department of Planning.

*Inter-generational & intra-generational equity*: the Proposals are part of an environmentally beneficial and sustainable transport strategy, and will create a legacy of improved natural and social environment

*Conservation of biodiversity and ecological integrity*: construction of the cycleways and associated actions to control weeds, rehabilitate and revegetate the sites post construction, and protect water quality will improve the ecological integrity of the areas affected by these Proposal.

*Improved valuation, pricing and incentive mechanisms*: maintaining the existing condition of the bushland in the Study Area could result in creeping environmental damage, and there would be costs associated with the clean up. Cycleways also encourage the use of alternatives to vehicles, with well-known benefits to the local environment and community health.



## 2 REPORT PREPARATION – METHODOLOGY

### 2.1 Literature Review

During the preparation of this REF, Council databases and other relevant reports and documents were accessed, previous studies and investigations for the Locality, and local history sources were also consulted.

The main documents referenced were:

- Flora and Fauna Studies & Site Assessments for Five (5) Sydney Water Properties in the Northern Suburbs of Sydney, including Castle Hill STP, Wrights Road Castle Hill (UBM 2009);
- Reviews of Environmental Factors for Cycleway Links in the Smalls Creek and Caddies Creek Riparian Corridors (UBM for THSC, various dates);
- Flora and Fauna Studies in support of a proposed Cycleway Link in the Cattai Creek Riparian Corridor (UBM September 2012); and
- Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0 (Tozer *et al.* for DECCW, 2010).

Previous studies searched the *EPBC Act* Online Database (DEWHA<sup>3</sup> 2008; search area five (5) km radius around the Study Area), the NPWS Atlas of New South Wales Wildlife Database (DECCW 2009a; search area 10 km x 10 km centred on the Subject Site) and BioNet Database (BioNet 2008; search area 10 km x 10 km centred on the Study Area) for previous recordings of flora and fauna species of conservation significance within the Region<sup>4</sup>. These databases were reviewed in 2012.

Plant identifications were made according to nomenclature in Plantnet (Plant Information Network System of Botanic Gardens Trust, Sydney). Stands of vegetation were described by their structural and floristic characteristics according to Specht (1981) and Tozer *et al.* (2006/2010). Endangered ecological communities ('EECs') were classified and named according to NSW Scientific Committee's Final and Preliminary Determinations (various dates).

The conservation significance of individual species, populations and ecological communities recorded was confirmed with reference to the Commonwealth *EPBC Act* and NSW *TSC Act*, in the National and State context.

<sup>3</sup> DEWHA – now Department of Sustainability, Environment, Water, Populations & Communities- SEWPAC

<sup>4</sup> Region is defined as an area within an approximate 10 kilometre radius of the Study Area.



## 2.2 Field Investigations

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The flora and fauna survey undertaken in support of this REF (UBM September 2012) includes an assessment of the conservation significance of the ecological communities, flora and fauna species and populations known to occur in the Locality in regards to current State (*TSC Act*) and Commonwealth (*EPBC Act*) environmental legislation. The occurrence of flora and fauna species, and populations with regional significance within the district and Region has also been addressed.

Background information and data has been sourced from previous studies undertaken for other Cycleway Links along local watercourses in The Hills Shire (UBM 2009, UBM 2010, 2011 and 2012).

A comprehensive flora and fauna survey in the Cattai Creek Riparian Corridor was carried out prior to the preparation of the current REF. Vegetation mapping (THSC 2005, Tozer *et al.* 2010) was reviewed, and targeted surveys were undertaken in order to determine existing site conditions and existing amenities. The suitability of the chosen route(s) was also assessed, and where appropriate, optional routes have been proposed.

Targeted searches were undertaken over a period of three (3) days in September 2012, searching for all flora and fauna species listed under the NSW *TSC Act* or Commonwealth *EPBC Act* (see Flora and Fauna Report, UBM September 2012).

Searches throughout the Study Area were also made for any mature hollow-bearing trees which might provide habitat for native fauna and likely to be impacted by the construction of the Cycleway Link. The location of hollow-bearing or other potential habitat trees was recorded using a handheld GPS and marked on a site map.

The location of sewer pipes, manholes / 'pop-top' outlets, drainage swales and outlets were noted, and recorded with a GPS. Erosion points along the bush tracks and fire trail, and where present, weed infestations behind houses and around drainage outlets were also noted.



## 3 DESCRIPTION OF THE ENVIRONMENT

### 3.1 Physical Environment

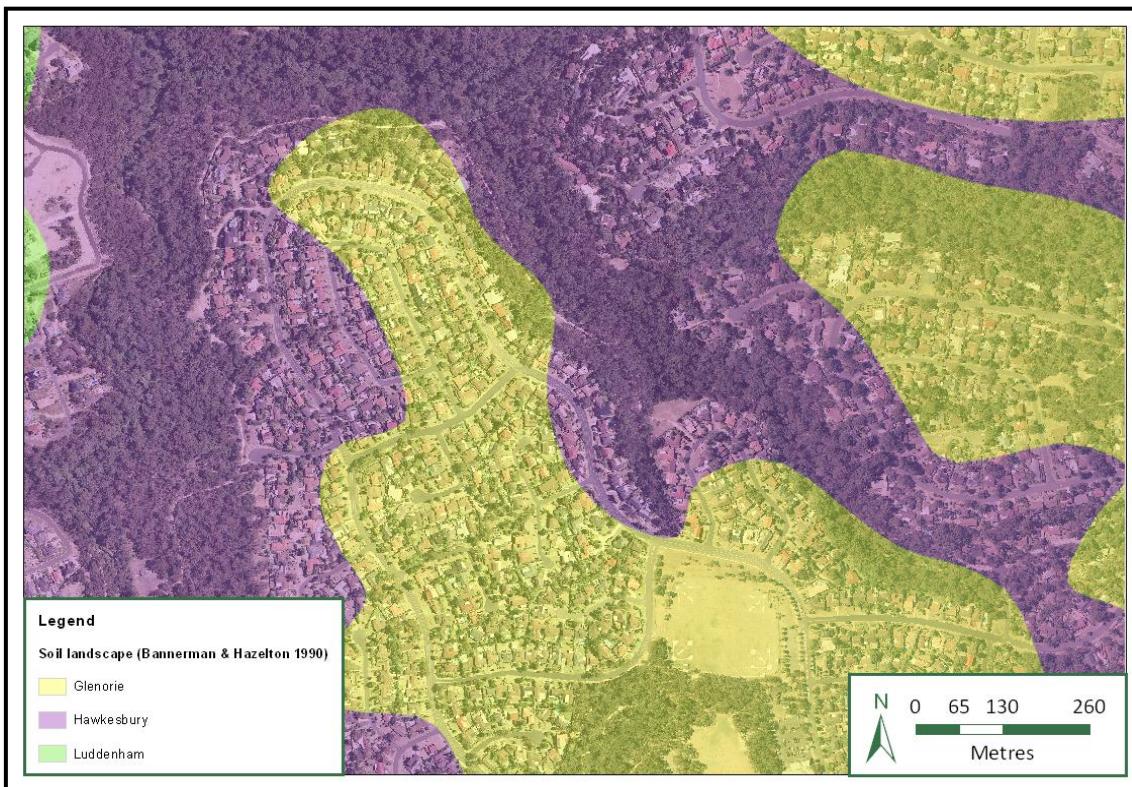
The physical characteristics of the Study Area and environs are summarised in *Table 3.1* below. This information has been summarised from the Flora and Fauna Report (UBM September 2012).

**Table 3.1: Physical Features of the Study Area & Environs**

FEATURE	DESCRIPTION
SOIL LANDSCAPE UNITS	<p>The Study Area is dominated by the <b>Hawkesbury</b> (ha) Soil Landscape Unit with small areas of the <b>Glenorie</b> (gn) SLU also occurring (see <i>Figure 3.1</i>). Bannerman &amp; Hazelton 1990).</p> <p>The <b>Hawkesbury SLU</b> forms a rugged landscape with rolling to very steep hills based on Hawkesbury Sandstone geology. Hawkesbury soils consist of shallow, medium to coarse grained quartz sandstones with minor shale and laminate lenses. They are subject to extreme soil erosion hazard, mass movement, steep slopes and rock outcrops and the soils are generally infertile and acidic.</p> <p>The <b>Glenorie SLU</b> forms a landscape dominated by undulating to rolling low hills on the Wianamatta Group Shales. Soils are generally shallow to moderately deep (&lt;100 cm) on crests and upper slopes to deep (&gt;200 cm) along drainage lines. Soils are subject to a high erosion hazard, localised impermeable highly plastic subsoil and like most shale-based soils they are moderately reactive once the protective vegetation cover is removed.</p>
TOPOGRAPHY	<p>The Hawkesbury SLU forms the steep rugged slopes and ridges of the Hornsby Plateau in the northern part of the Sydney Basin. Local relief is 40-22m, with slopes &gt;25%. There are large sandstone outcrops, floaters and benches with deeply incised valleys and steep side slopes present.</p> <p>Small areas of Glenorie SLU are found in the north, centre and west of the Study Area (see <i>Figure 1.3</i>), being mainly 'fringe sites' where the landscape is less rugged, the valley less deeply incised and grading into a landscape of low rolling low hills. Local landscapes generally conforms to these description, with the greater part of the survey area conforming to the typical Hawkesbury topography.</p>
LOCAL HYDROLOGY	<p>The <b>Cattai Creek sub-catchment</b> is located in the Greater Hawkesbury-Nepean Catchment. The major part of the proposed Cycleway Link is located on an unnamed eastern tributary of Cattai Creek, which joins into Cattai Creek to the north of Chainmail Crescent.</p> <p>For the purposes of this Report, together these two (2) watercourses will be described as the <b>Cattai Creek Riparian Corridor</b>.</p>
CLIMATIC DETAILS	<p>The mean daily maximum temperature is 28.4°C, with the highest temperatures recorded in December and January. The mean daily minimum temperature is 4.5°C, with the lowest temperatures recorded in June and July.</p> <p>Mean annual rainfall is 114.7 mm; with January, February and March recording the highest mean rainfall (Bureau of Meteorology 2012, #067026 Seven Hills (Collins Street)</p>



Figure 3.1: Soil Landscapes (Bannerman & Hazelton 1990)



## 3.2 Biological Environment

### 3.2.1 Vegetation Communities

The following information has been summarised from the Flora and Fauna Report prepared by UBM (September 2012).

Vegetation mapping by Baulkham Hills Shire Council (2005) describes the vegetation in the Study Area as 'Sandstone Gully Forest' with vegetation along the creekline supporting a 'rainforest-type' understorey. This mapping program has now been superseded by other workers (Tozer *et al* 2006/2012) and in some cases community nomenclature has been changed.

Vegetation mapping undertaken by Tozer *et al.* (2010)<sup>5</sup> for the former Department of Environment Climate Change & Water ('DECCW')<sup>6</sup> describes the remnant vegetation in the Study Area as **Hinterland Sandstone Gully Forest ('HSGF')** and **Sandstone Riparian Scrub ('SRS')** (see Figure 3.2).

Both HSGF and SRS are considered to be adequately represented in conservation reserves in the Sydney Basin Bioregion and are currently not listed under the threatened species legislation. Descriptions of the HSGF and SRS after Tozer *et al.* (2006/2010) have been included in the Flora and

<sup>5</sup> Known as 'SCIVI' - Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tableland, in *Cunninghamia* 11 (3)

<sup>6</sup> DECCW is now the Office of Environment & Heritage ('OEH') within the Department of Premier & Cabinet

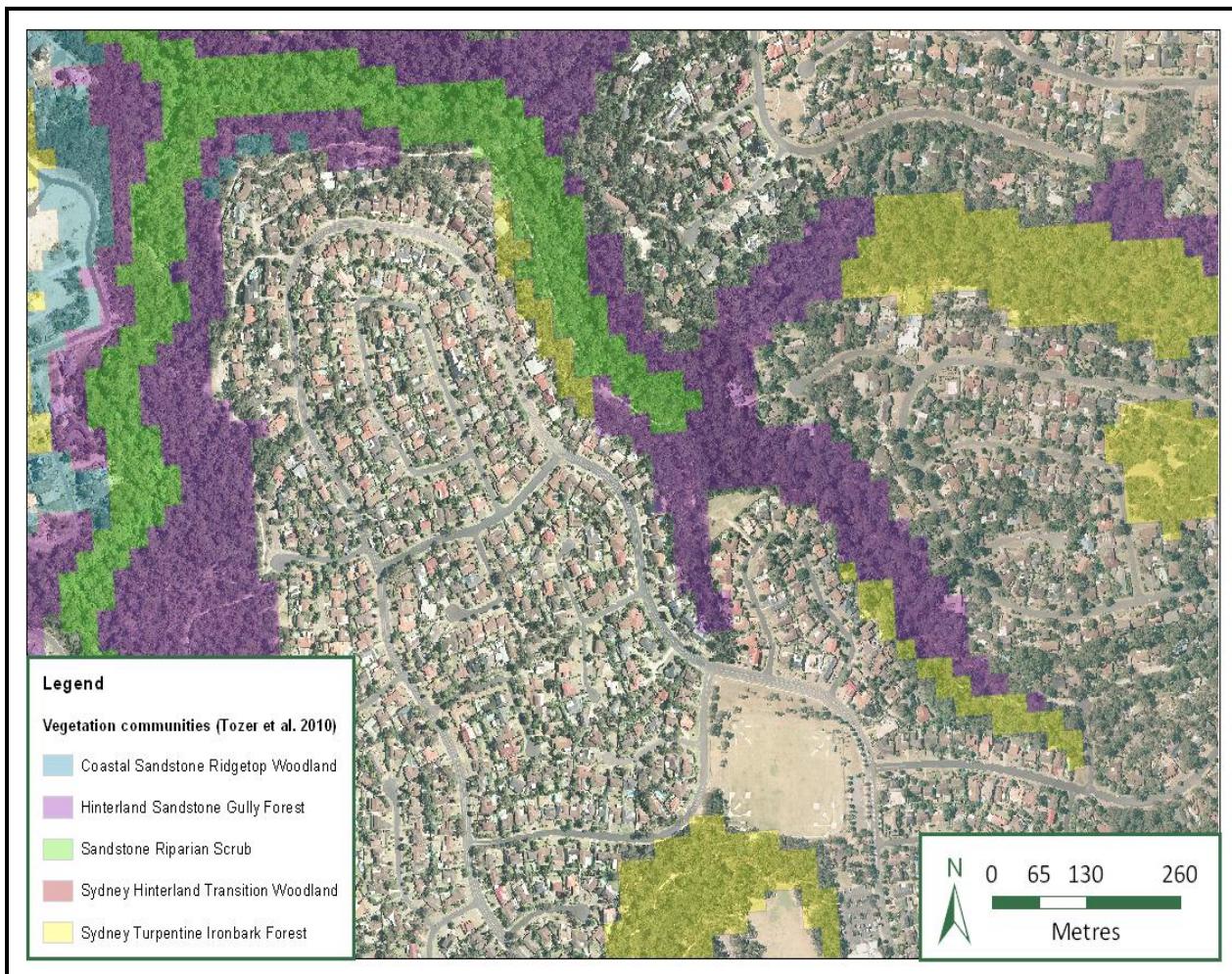


Fauna Report for the Cattai Creek Riparian Corridor prepared by UBM (September 2012).

Tozer *et al.* (2010) also maps an area of **Sydney Turpentine Ironbark Forest ('STIF')** at the far south-eastern end of the Study Area, near Linksley Road, with a second stand on the upper slopes of the fire trail below Ridgecrop Avenue (the latter being ex-Study Area) (see *Figure 3.2*). STIF is listed as an 'endangered ecological community' ('EEC') under the NSW *TSC Act* and as 'critically endangered' ('CEEC') under the Commonwealth *EPBC Act*.

The Tozer vegetation mapping is based on local geology and soil type, with limited ground truthing; so it is possible that a detailed site survey will modify this community designation. Site investigations (UBM September 2012) generally concurs with the mapped nomenclature, however for the purposes of this REF detailed flora investigations were undertaken to ground truth previous vegetation mapping (see UBM September 2012).

**Figure 3.2: Native Vegetation Communities Mapped for the Study Area (Tozer *et al.* 2010)**





### 3.2.2 Flora Species

A database search (OEH 2012, SEWPAC 2012) provided a list of 16 flora species known to occur in the Study Region and listed under the NSW *TSC Act 1995* and/or Commonwealth *EPBC Act 1999*.

An area 2-3 metres wide upslope and downslope of the proposed Cycleway Link using the Random Meander Method described by Cropper 1994) was undertaken.

A total of 156 species was recorded for the Study Area. Of this number, 125 species recorded (~80 %) are locally indigenous (native) species; while the remainder were either weeds or horticultural introductions (see Flora and Fauna Survey, UBM September 2012).

Two (2) naturally occurring species of conservation significance were recorded in the Study Area: *Epacris purpurascens* var. *purpurascens* and *Darwinia biflora*.

A third species *Syzygium paniculatum* (Brush Cherry) was also found, but given its location directly behind a residential garden, this is thought to be a horticultural planting or a garden escape (see Figure 3.3). Brush Cherry is listed under both the *TSC Act* (E1) and *EPBC Act* (V)

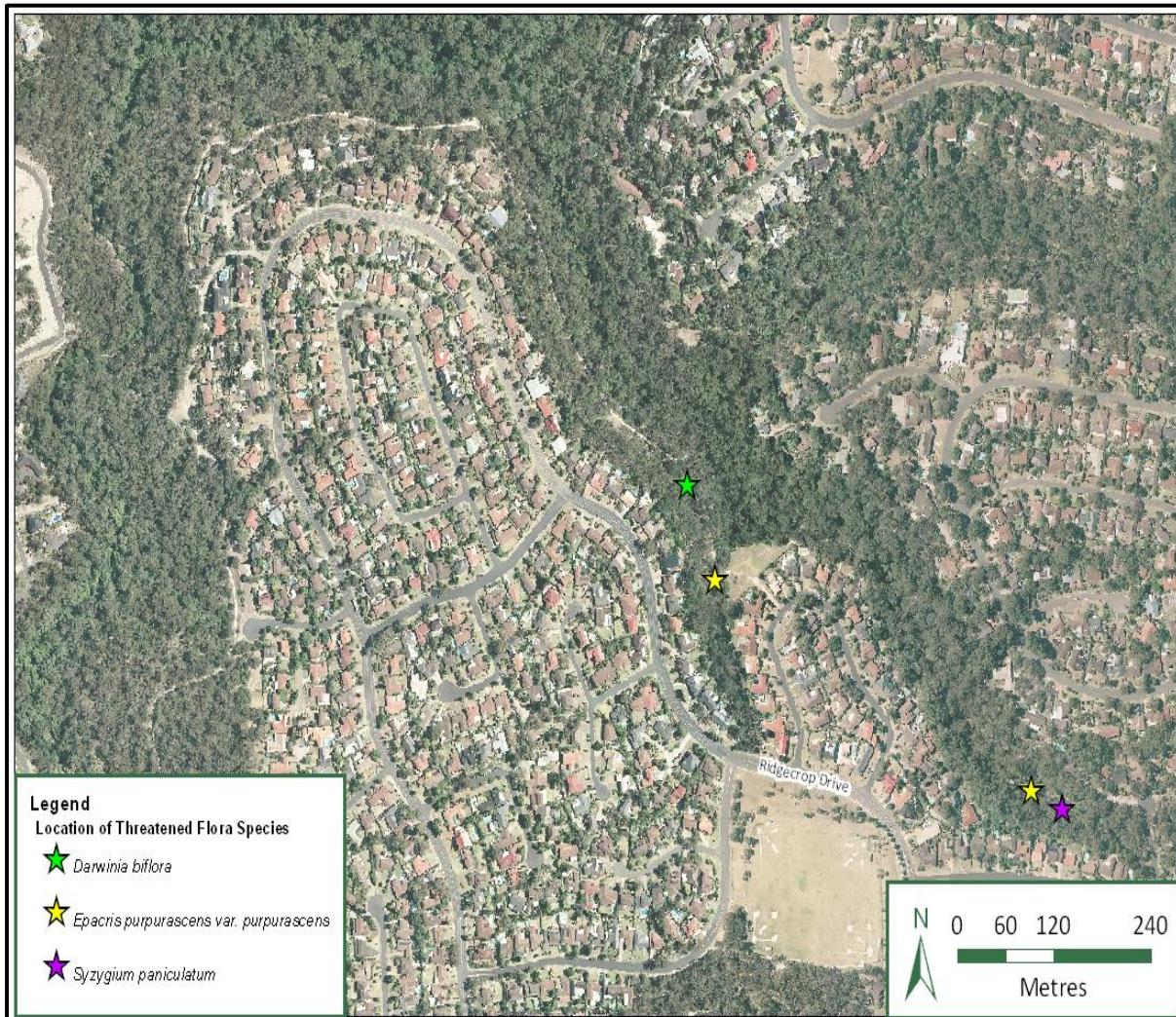
No other flora species listed under the NSW *TSC Act 1995* or Commonwealth *EPBC Act 1999* (per

Plate: *Darwinia biflora* and *Epacris purpurascens* var. *purpurascens* (source DEC 2004)





Figure 3.3: Location of Threatened Flora Species



### 3.2.3 Fauna Species

By the completion of the current field survey (September 2012), 31 bird species, one (1) species of native frog, two (2) species of native reptile and six (6) mammals were identified within or adjacent to the Study Area.

The **Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)** and **Little Lorikeet (*Glossopsitta pusilla*)** are listed as ‘vulnerable’ under the TSC Act and were identified during current field investigations (UBM September 2012). It is possible that other threatened species recorded for the Region would utilise the resources of the Study Area or the neighbouring properties on occasion for foraging, hunting, nesting or roosting.

A Seven-part Test of Significance (see Appendix D) for each of the following species will consider the impacts of the construction of the cycleway from Linksley Avenue to Rosebery Road:

- Little Lorikeet (*Glossopsitta pusilla*)
- Varied Sittella (*Daphoenositta chrysopera*)



- Powerful Owl (*Ninox strenua*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)

Each of the Seven-part Tests carried out for the species listed above have concluded that provided that the recommendations set out in this Report are followed, there will be no significant impact on any threatened fauna species.

### 3.2.4 Fauna Habitat

There were two (2) fauna habitat types recorded.

1. Woodland - fauna conservation significance: High
2. Riparian/creek - fauna conservation significance: *Moderate*

### 3.2.5 Hollow-bearing Trees

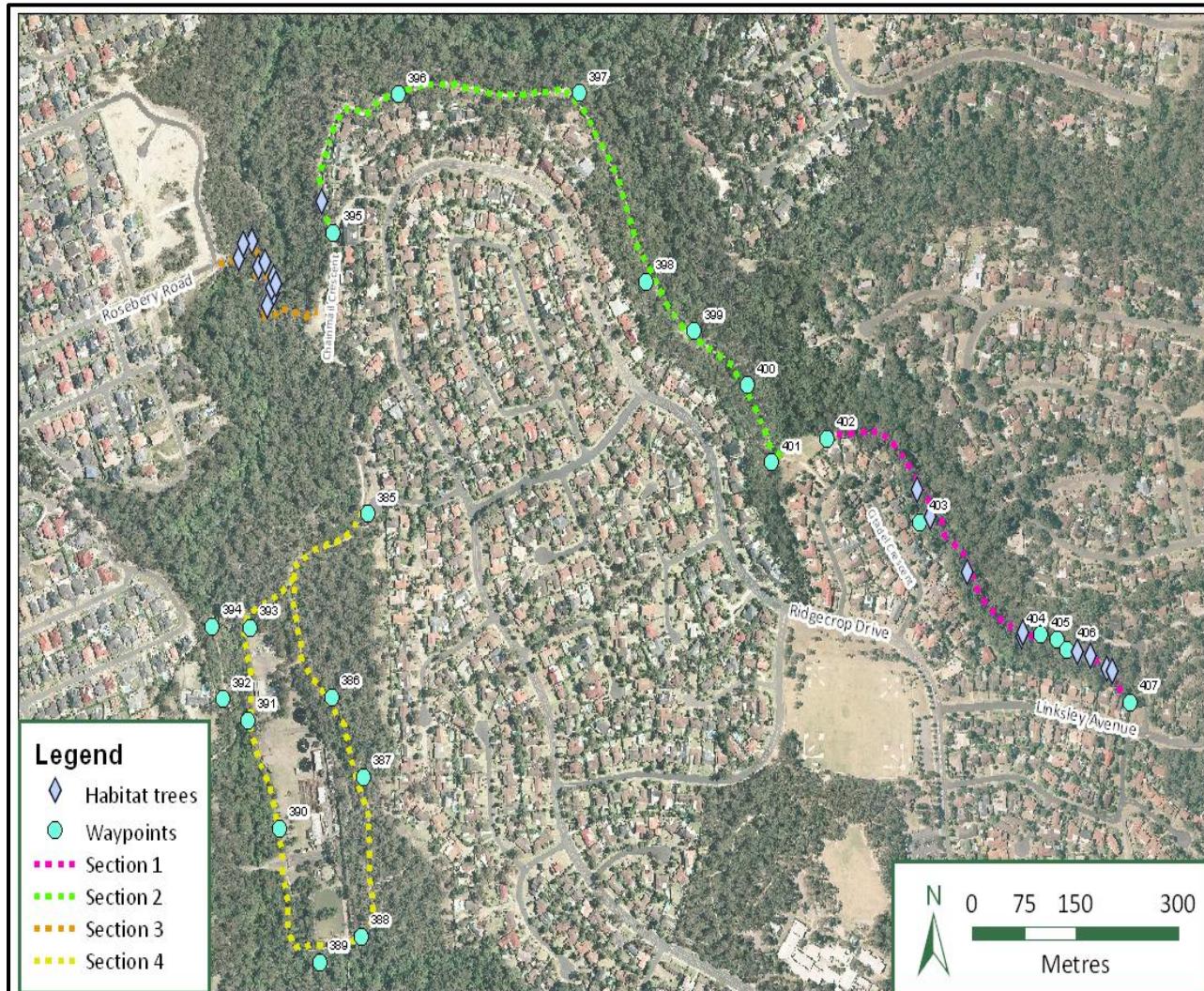
Some 21 native canopy trees were observed to contain, or were considered to potentially contain, hollows which might be utilised by native fauna. Trees were mapped within 2-3 metres of all existing tracks and trails. A significant number of these habitat trees are located at the far western end of the Cycleway Link which traverses bushland between Chainmail Crescent and Rosebery Road (see *Figure 3.2*).

If the Cycleway is realigned in Section 3 as proposed (see *Figure 1.2*), and even if the 'line of best fit' is applied, some of the hollow-bearing trees on the slopes below Rosebery Road may have to be removed or will be otherwise impacted. The route of the realigned Cycleway will require clearing of bushland (in some locations) for a width of only about three (3) metres. This can probably be achieved without impacting on any hollow-bearing trees between Sections 1 and 2 and the first part of Section 3.

However, the route of the Cycleway Link between Cattai Creek and Rosebery Road will have to scale a steep slope with large rock outcrops, especially toward the top of the escarpment. It is not known at this time exactly where the final route will be.



Figure 3.2: Location of Hollow-bearing Trees in each section of the Cycleway Link route





### 3.2.6 Conservation Significance of Vegetation

Vegetation mapping carried out by the former DECCW (now OEH) (Tozer *et al.* 2006 & 2010), and confirmed during this survey identifies two (2) plant communities occurring within the Study Area: Hinterland Sandstone Gully Forest ('HSGF') and Sandstone Riparian Scrub (SRS) (see *Figure 3.2*). Both HSGF and SRS are common occurrences in the Sydney Bioregion on sandstone soils, and both are considered to be adequately conserved in conservation reserves. Neither community is listed under the environmental legislation.

A small stand of Sydney Turpentine Ironbark Forest ('STIF') occurs at the far south-eastern end of the Study Area, near Linksley Road and Timber Grove, with another stand on the upper slopes of the fire trail below Ridgecrop Avenue (the latter being ex-Study Area) (see *Figure 3.2*). STIF is listed as an 'endangered ecological community' ('EEC') under the NSW *TSC Act* and as 'critically endangered' (CEEC) under the Commonwealth *EPBC Act*.

Two (2) naturally occurring species of conservation significance were recorded in the Study Area: *Epacris purpurascens* var. *purpurascens* and *Darwinia biflora*.

A third species Brush Cherry (*Syzygium paniculatum*) was also found but given its location next to a residential garden, this occurrence is thought to be a horticultural planting or a garden escape (see *Figure 3.3*). Brush Cherry is listed under both the *TSC Act* (E1) and *EPBC Act* (V).

Seven-part Tests of Significance indicate that no significant impacts to the STIF or the two (3) threatened flora species listed above will occur as the result of the Cycleway Link construction.

No other species of conservation significance was recorded within the Study Area (UBM Flora and Fauna Report, September 2012).

Two (2) species, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Little Lorikeet (*Glossopsitta pusilla*) - both listed as 'vulnerable' under the *TSC Act* - were identified in the Study Area. It is also possible that other threatened fauna species recorded for the Region would utilise the resources of the Study Area or neighbouring properties on occasion for foraging, hunting, nesting or roosting (see *Section 3.2.3* of this Report).

Seven-part Tests of Significance carried out for the two (2) threatened fauna and a number of other threatened faunas considered likely to utilise the resources of the Study Area on occasion, indicate that no significant impacts to threatened fauna or their habitats will occur as the result of the Cycleway Link construction.

## 3.3 Heritage and Cultural

### 3.3.1 Indigenous Heritage

A search of the OEH database for any items of indigenous heritage was undertaken in 2012 (Australian Heritage Information Management System – 'AHIMS'). Although a number of items are



known for the Kellyville/Glenhaven areas, these artefacts are located predominantly on Caddies Creek at some distance from the proposed Cycleway Link route (see *Appendix E*).

There are no (0) items of indigenous heritage known for the Study Area

### **3.3.2 European Heritage**

A review of THSC's heritage database was carried out.

There are no (0) items of European heritage listed for the Study Area.

## **3.4 Other Considerations**

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### **3.4.1 Noise**

The fire trail behind Ridgecrop Drive and the unmade tracks elsewhere on the proposed Cycleway route are located in bushland contained within a narrow, steep-side valley behind established houses on the ridgetops; these suburban streets being at some distance from major roads.

Any noise generated would arise from vehicles using local roads, and by landowners carrying out routine maintenance activities (lawn mowers, whipper snippers etc); mainly on weekends.

As motorbikes and mini-bikes are banned from using the Ridgecrop Drive fire trail, any noise arising from cyclists and/or pedestrians will be minimal and is unlikely to disturb nearby residents.

There are currently no significant noise issues or impacts for any part of the Study Area; however any loud noise generated from nearby properties is likely to 'echo' throughout the narrow valley on occasion.

Construction work in Section 3 of the Study Area may produce a considerable amount of noise, especially for bridge construction. However, this noise will be for the duration of the works only.

### **3.4.2 Air Quality**

Air quality will be affected by prevailing wind and air pattern movements, shaped by topographic factors around the subject land and pollutants arising from the cars using local roads.

Other factors likely to affect air quality are:

- Weather patterns in the wider metropolitan area, particular in the cooler winter months when inversions are common and smog and air pollutants are trapped under a layer of cold air; and
- Wildfires and prescribed burns in local bushland create smoke, which contributes to fine particle pollution. Bushfire smoke can reduce visibility along local roads and highways and aggravate existing pulmonary conditions

Being located in native bushland at some distance from major roads, the air quality is good. There is no industrial development in the Locality.



### 3.4.3 Work Sites, Access and Vehicle Movements

The works are generally accessible for vehicles from a number of locations: Linksley Avenue (east), the grassed area behind Citadel Crescent and Chainmail Place (centre), and both ends of the Ridgecrop Drive fire trail (see *Figure 1.2*).

The Ridgecrop Drive the fire trail has been paved with decomposed granite and apart from a few minor erosion or subsidence points, the fire trail is in good condition. The unmade track from Linksley Avenue to Citadel Circuit is often right on the edge of the creek bank and so this track is generally not suitable for large vehicles, and construction materials may have to be brought in on foot.

Similarly the narrow unmade tracks from Drawbridge down to and across Cattai Creek are steep, rocky and generally unsuitable for cyclists in their present condition. A number of informal foot tracks leading from nearby roads access this part of the route, so that access for small vehicles, quad bikes or similar may be possible.

### 3.4.4 Visual Amenity

Tall dense forest is visible from adjoining houses and local streets, providing a scenic backdrop to local residential areas. Woodland occupies the ridges and upper slopes, while tall trees typical of a ‘forest’ vegetation type are found on the lower slopes and along the creeks. The adjoining residential suburbs have been developed within a ‘bushland setting’.

Weed populations are minimal through most of the local bushland, although introduced species (particularly woody weeds such as Privet) occur on edge sites and around drainage lines. Rubbish is brought into the bushland via the stormwater system and accumulates along the various watercourses. The road verge and embankment directly below Rosebery Road is particularly badly affected by dumping.

Small-leaved Privet is extremely dense on the banks of Cattai Creek and on the slopes below Rosebery Road; this weed infestation appearing to originate at the outlet of a stormwater drain. Privet is a noxious weed and given its propensity to invade and destroy riparian bushland, this infestation should be controlled with all speed.

### 3.4.5 Recreational Amenity

There are no formal active recreational facilities located in the Study Area. The closest recreational reserve is located at Castle Glen Reserve, which is at the southern end of Ridgecrop Drive near the Knightsbridge Shopping Centre (ex-Study Area).

Passive recreational opportunities exist in the bushland as a network of tracks and trails follows the southern banks of Cattai Creek and the unnamed eastern tributary (see *Figure 1.2*). These tracks and fire trails are used by pedestrians, dog walkers and cyclists. Anecdotal evidence suggests that these tracks are also used by BMX or motorbikes.

See The Hills map of walking tracks @ [www.thehills.nsw.gov.au/walking-tracks.html](http://www.thehills.nsw.gov.au/walking-tracks.html).





## 4 ASSESSMENT OF LIKELY IMPACTS & PROJECT SAFEGUARDS

### 4.1 Physical Environment

#### 4.1.1 Geology, Topography and Soils

The route of the proposed Cycleway Link traverses bushland in the Cattai Creek Riparian Corridor. Topography includes moderate to steep-sided slopes below the unmade track (Section 1) and fire trail below Ridgecrop Avenue (Section 2); with very steep slopes in the valley downslope of Rosebery Road (Section 3).

Sandstone bedrock is visible in the bed of Cattai Creek and its eastern unnamed tributary, while sandstone outcrops and ‘floaters’ occurred on the slopes throughout the Study Area.

The proposed Cycleway Link is located predominantly on the Hawkesbury Soil Landscape Unit, although there is likely to be some minor shale influence originating from the ridgetops. The soils were mainly sandy, with large sandstone outcrops and ledges being present. In places it was difficult to see all parts of the slope owing to the generally dense ground cover and difficulty of access through thick bushland.

The proposed works will involve some excavation (cut and fill) – mainly in Section 1 and Section 3, and the importation of fill and other materials for the construction of the Cycleway Link (whether hard paving or boardwalk). The Cycleway will necessarily impact on the bushland understorey along the bush track in Section 1 as the Cycleway will be within a few metres of the Creek, while in Section 3 the track down to Cattai Creek is very narrow and will need to be widened. There is likely to be some environmental impact in these areas. Consequently, a number of safeguards will need to be applied during the planning and construction phases.

The existing fire trail behind Ridgecrop Drive (Section 2) is wider than the usual three (3) metres required for Cycleways. It is already paved with decomposed granite, and apart from levelling a few bumps and repairing a few small erosion points along the trail no further impact on geology, topography or soil is anticipated.

The environmental impacts of constructing a Cycleway Link between Chainmail Crescent and Rosebery Road (Section 3) will depend on which option is adopted by THSC (see *Section 1.4*). Impacts will occur if a high-level bridge is constructed over the gully to link up with Rosebery Road – this being the most direct route between Citadel Crescent and Rosebery Road. A considerable area of native vegetation will also require clearing. Therefore significant safeguards will need to be applied during the construction phase.

The alternative route from Citadel Crescent via a series of bush tracks downslope to Cattai Creek and then up to Rosebery Road (*Section 3*) will involve some damage to geological features as the track will need to be widened to accommodate the Cycleway. The existing tracks are about one (1) metre wide, or less, and they currently skirt around large rock outcrops. Some of these rock outcrops near the top of the escarpment below Rosebery Road are very high and difficult to climb.



Recommendations to avoid damage are as those for Section 1 (realignment, boardwalks etc). The construction of a high-level bridge may be required to reach Rosebery Road.

#### ***Safeguards for Geology, Topography and Soils***

The actions to mitigate impacts on geology, topography and soils are set out below.

- Restrict vegetation clearing and soil disturbance to the smallest possible area required for construction purposes.
- Where geological features (rock outcrops) occur, consider the use of boardwalks instead of hard paving.
- Avoid damage to geological features by making minor adjustments to the Cycleway Link, as required. Rock blasting should not be necessary.
- Fill material imported into the site should be certified weed-free and if possible, be of similar structure and composition as the ‘parent soils’ in the Study Area (e.g. crushed sandstone. Low nutrient, low impact materials such as decomposed granite are also suitable).
- Identify access routes, parking areas and stockpile sites and define these by the erection of exclusion fencing. Generally these will be outside the Corridor, although the wide grassed fire break behind Citadel Close and grassed road verge at Chainmail Circuit may also be used. This will prevent damage to bushland and contain soil wash/erosion of the exposed topsoil.
- Remove surplus soil, any debris generated, and all other construction material off-site at the conclusion of works.
- Post-construction ensure the rehabilitation of any damaged vegetation.

Undertaking of the above-listed safeguards will ensure that impact on topography and soils during the project will be minimal.

#### **4.1.2 Water Quality and Drainage**

Potential impacts on water quality and drainage include movement of newly installed fill and other material (if uncontained) into nearby Cattai Creek or its eastern tributary or into drainage swales on the slopes, particularly during periods of heavy rain; likely to result in sedimentation and an increase in turbidity.

It was noted that several of the concreted drainage swales crossing the fire trail behind Ridgecrop Avenue and drains and creeks crossing over the track from Drawbridge Place contained large amounts of rubbish, and were surrounded by weeds. Debris and weed propagules are then washed down into the creek waters and transported downstream.

Stockpiled fill also has the potential to contaminate nearby watercourses during heavy rain if not properly covered and contained with appropriate bunding material. Other potential impacts include contamination of watercourses by solvents such as fuel/oil/coolant due to spills and leaks from vehicles, plant and other earthworks associated machinery.

#### ***Safeguards for Water Quality and Drainage***

The actions to mitigate impacts on water quality and drainage are set out below.



- Retain a vegetated buffer zone between excavation or construction works and drains and/or the main waterways – Cattai Creek and its unnamed eastern tributary.
- If such a vegetation buffer is not available, install hay bales and secure silt fencing, ensuring that these remain in place for the duration of the works<sup>7</sup>.
- Avoid stockpiling soil, vegetation debris or other construction material within three (3) metres of any drainage swale or the creek. Where such stockpiles are required, they should be surrounded by hay bales and silt fencing, secured and covered to avoid scour or wind dispersal.
- Drainage must be allowed to pass uncontrolled across or underneath the Cycleway, and wherever possible water should be allowed continue along similar lines to present drainage patterns (notwithstanding the need to arrest some minor erosion points).
- Containment and proper off-site disposal of wastes (fill soil, surplus construction material) to prevent leachate reaching the waterway.
- Maintenance of general site cleanliness (including removal of accumulated rubbish prior to and after commencement of construction).
- All vehicles, plant and machinery should be regularly inspected (daily) for leaks.
- All solvents should be stored in their original containers and/or appropriate containers.
- Any solvent leaks/spills should be appropriately bunded to contain the spill and appropriate clean up measures be undertaken as soon as possible.

Undertaking of the above-listed actions will ensure that impact on water quality and local drainage patterns during and post construction will be minimal, and if any such damage occurs, that remediation will be undertaken. .

## 4.2 Biological Environment

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### 4.2.1 Flora

#### *Potential Impacts on Flora*

The Cycleway Proposal would require the clearing of a narrow band of (mainly understorey) vegetation in some parts of the bush track in Section 1, although by using the existing fire trail which is already cleared and paved (Section 2), most of the bushland along the whole 1,910 metre length of the Cycleway route is unlikely to be impacted. The main areas of bushland likely to be impacted are in Section 3 (Citadel Crescent to Rosebery Road).

Additional clearing will be necessary to widen existing tracks and where batters are required in low sections or ‘pinch-points’ (mainly in Section 1 Linksley Avenue to Citadel Crescent). The narrow bush track in Section 3 (Chainmail Crescent to Rosebery Road) will require considerable clearing.

The amount of fill and length of batters is likely to be greater if all parts of the proposed Cycleway Link are also to be used as a fire trail as it would need to support heavy fire fighting vehicles.

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<sup>7</sup> A Soil and Water Management Plan should be in place prior to the commencement of construction works.



The impacts on the native vegetation will, or are likely to include:

- Clearing of native vegetation to facilitate Cycleway and/or bridge construction;
- Removal or damage to some of the mature native canopy trees, especially along Sections 1 and 3 of the proposed route;
- Accidental damage to vegetation (including damage to trees) as result of machinery incursion;
- Soil compaction as a result of excavation required for construction;
- Importation of fill soil and other foreign material for construction;
- Soil and substrate material stockpiled in bushland during construction
- Increased level of pedestrian and/or trail bike activity throughout the bushland; and
- Increase in weed invasion into disturbed/cleared areas, especially around drainage swales and outlets (where weeds are already well established).

In addition, the clearing of native vegetation (especially close to the unstable creekbanks) would be likely to increase soil disturbance and promote a number of Key Threatening Processes, including:

- Invasion, establishment and spread of woody weeds into the bushland (e.g. Privet, Lantana - already on site);
- Invasion and establishment of exotic vines and scramblers (Bridal Creeper, Honeysuckle Wandering Jew (already on site);
- Introduction of plant diseases (i.e. *Phytophthora cinnamomi*) from unhygienic (unwashed) machinery; and
- Invasion of native plant communities by exotic perennial grasses (already present).

### ***Safeguards for Flora***

The actions to mitigate impacts on native flora are set out below.

- The Cycleway corridor should be as narrow as possible (no more than three [3] metres) and any significant clearing of native vegetation beyond that width should be avoided.
- The Cycleway should be constructed through bushland using ‘the line of best fit’, thus avoiding mature canopy trees, and other significant vegetation.
- During the course of the project, temporary fencing should be erected in all environmentally sensitive locations, being the riparian vegetation on the lower slopes close to the creekwaters, and maintained until such time as works are completed.
- Stockpile sites and shed sites should also be identified. The storage of equipment or machinery in bushland outside the Construction Corridor should not be permitted.
- Restrict the extent of vehicle movements during construction to limit disturbance of bushland. Construction vehicles should restrict their movements to a predetermined access and egress route.
- The Cycleway should be formed of concrete, crushed sandstone, decomposed granite or a similarly inert material, and (preferably) edged.



- In order to avoid further damage to geological features and/or native vegetation, the use of bridges or boardwalks should be considered.
- Considering that the Cycleway will in part, traverse areas where weeds are already established, an area of at least three (3) metres on each side of the path should be cleared of weeds and post construction, mulched and replanted with locally indigenous groundcovers.
- Soil used as infill or for minor changes of level, are to be sourced from a reputable commercial source and *guaranteed* ‘weed-free’. Other than material required to form the Cycleway, no imported soil is to be placed within the bushland.
- Plants used for bushland rehabilitation should be indigenous to the relevant plant community. Council’s Community Nursery is a good source of plant material.

Undertaking of the above-listed actions will ensure that the impact of the proposed works on species, populations and vegetation communities within the Subject Site will be minimal, and any such damage would be remediated.

Provided that appropriate precautions are taken during construction, it is considered that the realigned Cycleway will not have a *significant* negative impact on the bushland. The implementation of bush regeneration works at the conclusion of works is likely to significantly increase local biodiversity and habitat values of the HSTW community within the Cattai Creek Riparian Corridor.

Based on the outcomes of the field surveys combined with the results of the literature and database review, it is considered that the Cycleway Proposal can proceed as planned. Within the Study Area provided that the safeguards below are implemented, no major flora constraints were identified that would prevent the construction of the Cycleway Link in this area.

### 4.2.2 Fauna

#### Potential Impacts on Fauna

Current fauna surveys (UBM September 2012) recorded two (2) species listed as ‘Vulnerable’ under the TSC Act, the Little Lorikeet (*Glossopsitta pusilla*) and Varied Sittella (*Daphoenositta chrysopera*).

Although no other threatened fauna were recorded for the Study Area, although it is considered that suitable habitat exists for a number of other threatened fauna (see Section 3.2.3).

Accordingly Assessments of Significance (Seven-part Tests) were undertaken to consider the potential impacts of the Cycleway Proposal on the two (2) recorded threatened species, and those species which are listed for the Locality and Region. These Assessments have concluded that the Cycleway Proposal would not result in these species, their populations or habitats being significantly impacted upon, although this opinion has assumed that the area of bushland to be cleared for construction purposes will be kept to a minimum.

These Assessments have also been based on the premise that the Cycleway Links would be located predominantly on existing bush tracks, fire trails or on cleared land. However, as the proposed realignment will now traverse bushland in part (Section 3), under the precautionary principle updated Assessments have been undertaken as part of this REF. See Appendix D for Assessments of Significant for any threatened fauna likely to occur.



### ***Safeguards for Fauna***

- The Cycleway construction corridor should be as narrow as possible (no more than three [3] metres) and any significant clearing of native vegetation and habitat beyond that width should be avoided.
- There are some 21 habitat trees within 2-3 metres of the existing bush tracks and fire trail' with many of these being located on the bushland slopes in Section 3. Any trees in close proximity to the Cycleway corridor likely to require lopping should be checked for the presence of native fauna.
- Where applicable and safe from a public perspective, fallen trees, logs and large woody debris should not be removed from the site. If removal is required, they should be relocated into bushland adjacent to the new Cycleway.
- Post development, enhancement and maintenance of the woodland should be undertaken through standard rehabilitation measures (i.e. weeding and indigenous replanting).

Undertaking of the above-listed actions will ensure that the impact of the proposed works on native fauna species, populations or fauna habitats within the Subject Site will be minimal, and any such damage would be remediated.

## **4.3 Heritage and Culture**

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### **4.3.1 Indigenous Heritage**

#### ***Potential Impacts on Aboriginal Heritage***

There are no (0) known items of Aboriginal heritage known for the current Study Area (AHIMS search 2012 – see *Appendix E*).

Based on the results of the literature and database review, it is considered that the Cycleway Link Proposal can proceed as planned, as long as the recommendations set out below are implemented.

#### ***Safeguards for Aboriginal Heritage***

The actions to mitigate impacts on items of Aboriginal heritage are set out below.

- If any other item of heritage or cultural significance becomes known during the course of the works, all work is to cease; the contractor is to notify Council immediately, and the Cultural Heritage Division OEH (Parramatta Office) is to be informed.
- Work is not to resume until written permission is provided to Council by the OEH.

Undertaking of the above-listed actions will ensure that impact on any items of Aboriginal cultural heritage value discovered during the project will be avoided.

### **4.3.2 European Heritage**

#### ***Potential Impacts on European Heritage***

There are no (0) items of European heritage known for the Study Area. No such items are listed under Baulkham Hills LEP 2005 or draft Hills LEP 2010.



Based on the outcomes of the literature and database reviews, it is considered that the Cycleway Link Proposal can proceed as planned. Within the Study Area, no major historical or cultural constraints were identified that would prevent the construction of the Cycleway Link.

### ***Safeguards for European Heritage***

The actions to mitigate impacts on items of European heritage are set out below.

- Procedures to be undertaken if any items of European heritage are located during on-ground works are similar to those described for items of Aboriginal heritage (above); i.e. all work is to cease and the project manager THSC is to be notified immediately.
- The relevant Council officers will investigate the find, and on-ground work is not to recommence until such time as clearance is provided to the contractor in written form.

Undertaking of the above-listed actions will ensure that impacts on any items of cultural or heritage value discovered during the project will be avoided.

## **4.4 OTHER CONSIDERATIONS**

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### **4.4.1 Noise**

#### ***Potential Impacts on Noise***

Sources of noise from the proposed development and landscape enhancement activities will include:

- Earthmoving machinery for the (minor) re-grading of local topography;
- Vehicles and machinery for the construction of the Cycleway and other items required;
- Bridge construction; and
- Equipment such as chainsaws and (post construction) planting devices (e.g. posthole diggers) associated with the site landscaping.

Most of these activities would be undertaken only during the construction period and thereafter infrequently (e.g. site maintenance), and would be restricted to daylight hours.

The construction phase will entail access by trucks and earth-moving machinery, including those required for the provision of secure footing by the installation of reinforced boardwalks and similar.

Landscaping and proposed bush regeneration works will not generate noise, with the possible exception of soil augers or a machine mounted posthole digger if these are used to dig holes for the tree planting (see Safeguards below). The impact of the proposed works on noise levels will be minimal, and there will be no disturbance to any residential properties.

Based on the outcomes of the field surveys and visual assessment, it is considered that the Cycleway Link Proposal can proceed as planned. Within the Study Area, other than the short-term noise generate by construction work, no major noise constraints were identified that would prevent the undertaking of the proposed development.



### ***Safeguards for Noise***

The actions to mitigate noise impacts are set out below.

- Normal works hours will only be Monday to Friday 7 am to 6 pm. Machinery preparation noise before 7 am must be minimised. No machinery start up can occur before 7 am.
- Saturday may be considered work time between 7 am and 1 pm, provided that work before 8 am is inaudible to adjacent properties. No construction work is to occur on Sundays or Public Holidays. Should unforeseen circumstances occur, and out of hours work is essential, (e.g. for safety reasons) local residents must be informed of both the reason for the works and likely duration.
- The Construction Contractor will be required to implement Best Practice Measures to reduce noise impacts. As the proposed works are of a minor nature, it is not envisaged that noise monitoring will be required.

Undertaking of the above-listed actions will ensure that any noise impact on neighbouring properties during the project will be minimal.

### **4.4.2 Air Quality**

#### ***Potential Impacts on Air Quality***

The major source of air pollution from works associated with the Cycleway construction will be dust created by the construction works (e.g. installation of Cycleway) but only if climatic conditions are particularly dry. Dust emissions from vehicles during ingress and egress are also likely during construction works. However, the works will be short-term, and it is not anticipated that associated landscape works (e.g. planting) or (future) bush regeneration works will create any air quality problems. The impact of dust on air quality can be minimised if appropriate management actions are undertaken.

Based on the outcomes of the field surveys and visual assessments, it is considered that the Cycleway Proposal can proceed as planned. Within the Study Area no constraints relating to air quality were identified that would prevent the undertaking of the proposed development.

#### ***Safeguards for Air Quality***

The actions to mitigate impacts on air quality are set out below

- All vehicles and other machinery entering and exiting to keep to predetermined access routes (i.e. construction corridor).
- Avoid disturbing or otherwise disturbing soil from areas other than the immediate construction zone.
- Soil and construction material imported into the site to be stockpiled in a predetermined site, contained by paraweb fencing and covered with black plastic until such time as they are required.
- Excavated material (surplus to needs) to be removed from the site at the conclusion of works.
- Mulch or revegetate bare soil/disturbed sites as quickly as practicable after completion of works.



Undertaking of the above-listed actions will ensure that any impact on air quality in the locality during the project will be minimal.

#### 4.4.3 Traffic Levels and Accessibility

##### *Potential Impacts on Traffic Levels and Accessibility*

There are access/egress points to the existing fire trail: at Citadel Crescent and at the end of Ridgecrop Drive near Arbor Glen. These are suitable for machinery or vehicular access. The unmade track from Citadel Crescent to Linksley Avenue does not provide suitable vehicular access and this provides some constraint to the works (see *Figure 1.2*).

The narrow tracks between Chainmail Crescent and Rosebery Road (Section 3) or to Wrights Road (Section 4) are not suitable for vehicles, although there are a number of foot tracks leading from nearby roads in Section 2 which might serve to bring in construction materials provided that small sized vehicles are used.

Other than the Ridgecrop Drive fire trail, there are no formalised walking paths in the Study Area.

All works will be carried out internally, although it is anticipated that workers' vehicles will be parked at either end of the Cycleway Link Corridor; on the wide grassed fire break behind Citadel Crescent, or the grassed verge at Chainmail Crescent. Vehicles parked in residential areas must ensure that there is no interference with local traffic conditions as a result of the works.

Based on the outcomes of the field surveys and visual assessments, it is considered that the Cycleway Proposal can proceed as planned. Within the Study Area, no constraints relating to traffic and accessibility were identified that would prevent the undertaking of the proposed development.

##### *Safeguards for Traffic Levels and Accessibility*

The actions to mitigate traffic level impacts and accessibility are set out below.

- Park all vehicles off-street during construction: inform local residents of works where parking is proposed close to residential development.
- If possible, park vehicles in the grassed fire break behind Citadel Crescent or on grassed road verges (Chainmail Crescent) where there are no residential dwellings.
- Fence the Construction Corridor to temporarily restrict access to bushland.
- Install bollards/gates at each end of the fire trail to prevent access to unauthorised vehicles and trail bikes.
- Adequately signpost work sites altering pedestrians of work underway and provide a sign posted detour/alternate route for pedestrians where appropriate.

Undertaking of the above-listed actions will ensure that traffic and access issues with the potential to impact on neighbouring properties during the project will be minimal.



#### 4.4.4 Visual Amenity

##### *Potential Impacts on Visual Amenity*

The proposed works has the potential to improve the visual amenity of the site, especially where weedy vegetation occurs next to the existing bush tracks. Construction of a formalised Cycleway will replace the unmade track in Section 1 which is uneven, rocky and often muddy. The removal of weeds and dumped rubbish from bushland adjacent to the concreted drainage swales will also serve to improve visual amenity and protect bushland from further weed invasion.

Waste generated from the works will impact on visual amenity *only* if left on site following completion of works, and also create a fire hazard. Further, plant and vehicular access associated with works may result in bushland within the Construction Corridor becoming degraded as weeds invade disturbed areas.

Based on the outcomes of the field surveys and visual assessments, it is considered that the Cycleway Link Proposal can proceed as planned. Within the Study Area, no constraints relating to visual amenity were identified that would prevent the undertaking of the proposed development.

##### *Safeguards for Visual Amenity*

The actions to mitigate impacts on visual amenity are set out below.

- All waste generated during works including any surplus fill material be contained throughout the duration of works and removed off site.
- Disturbed ground due to machinery access and other aspects of the works should be rehabilitated immediately following completion of works and replanted using locally indigenous species.

Undertaking of the above-listed actions will ensure any impact on visual amenity or after during the project will be minimal

#### 4.4.5 Utilities and Services

A sewer line is located along the length of the Cycleway route, with a series of manholes were noted along the eastern side of the gully. Crossover pipes also occur at several locations.

A large sewer main is located close to the Chainmail Crescent track.

An electricity easement crosses over Cattai Creek from Chainmail Crescent to Rosebery Road.

Always 'Dial before You Dig' to ensure that no services are located in the area of operations.



## 5 Summary of Environmental Impacts

*Tables 5.1 - 5.10* contain descriptions of the existing environment in the Study Area, applicable statutes and instruments, impacts from the proposed works as assessed through this REF, and recommended measures for addressing or avoiding any identified impacts.

All the measures identified in *Tables 5.1 - 5.10* will be implemented during the works. The Project Manager THSC has responsibility to ensure the measures are properly applied to the work site.



Table 5.1: Overview of Environmental Impacts - Landscape, Geology &amp; Soils

Item/Issue	Site Location	Existing Environment	Legal and Policy Considerations	Impact	Measures
Landscape, Geology & Soils	All parts of the Study Area, but main focus of geological impact will be Section 3	Soil Landscape Unit Hawkesbury (ha) with small areas of Glenorie (gn) SLU  Sandstone soils with some shale influence  Sandstone Soils with extreme soil erosion hazard  Limitations: mass movement, steep slopes, rocky outcrops, shallow stony, highly permeable soil, low fertility	<i>Soil Conservation Act 1938</i>  <i>Water Management Act 2000</i>	Creek bank erosion, & potential for undermining and collapse when vegetation near creek is cleared  Sedimentation of water bodies downslope unless erosion is controlled  Sheet & gully erosion potential on steep slopes when vegetation cover is removed	Adhere to guidelines set out in Managing Urban Stormwater: Soils and Construction (Landcom, March 2004) – “The Blue Book”  <b>NOTE</b> requirements of Acid Sulphate Soil Manual (ASSMAC)
Comments:	Provided that appropriate safeguards are implemented the proposed Cycleway Link is not expected to impact on Cattai Creek or its eastern tributary. Safeguards to prevent damage to geological features in Section 1 (Linksley Avenue to Citadel Crescent), Section 3 (Citadel Crescent to Rosebery Road) will be required. The route of the Cycleway will be located on the existing fire trail (Section 2), while options for Section 3 which avoids removing a significant area of native bushland have been proposed.				



Table 5.2: Overview of Environmental Impacts - Water, Drainage &amp; Runoff

Item/Issue	Section Location	Existing Environment	Legal and Policy Considerations	Impacts	Measures
Water, Drainage & Runoff	Section 1	Cycleway located over existing unmade track (rocky, narrow and uneven surface)	<i>Water Management Act 2000</i> <i>Soil Conservation Act 1998</i> <i>Sydney Water Environmental Policy</i>	Runoff from construction may carry sediment into Creek and/or dams and increase erosion along path verge.  Pinch-points with only a few metres between track and creek	Sediment fences, hay bales and other devices to be installed prior to commencement of construction to prevent erosion & sedimentation. Imported fill not to be stockpiled along the track, but brought in as required.
	Section 2	The Cycleway will be located on the existing fire trail behind Ridgecrop Drive (no impact)	<i>Rural Fires Act/Amendment</i>	Soil stability, urban runoff in drainage swales impacting on water quality  Potential to spread accumulated rubbish and weeds unless controlled prior to construction  Need to keep fire trail open and managed to provide access to fire fighting vehicles.	Adherence to Managing Urban Stormwater: Soils and Construction (Landcom, March 2004) – “The Blue Book”  Adherence to Acid Sulphate Soil Manual (ASSMAC) as required  Sediment fences, hay bales and other devices to be installed on works site close to the creeks prior to construction to prevent erosion & sedimentation  Stabilise exposed soils within 7 days of clearing (mulch, erosion control fabric, nurse crop), or as soon as practicable
	Section 3	Existing bush tracks access Cattai Creek		Depending on route taken, impacts as per Sections 1 and 2 (see Section 4.1)	As for Sections 1 and 2  NOTE: large infestation of Privet below Rosebery Road below drainage outlet



Table 5.3: Overview of Environmental Impacts - Flora &amp; Fauna Issues

Item/Issue	Section Location	Existing Environment	Legal and Policy Considerations	Impact	Measures
Flora & Fauna Issues	Section 1	Community: Hinterland Sandstone Gully Forest  Sydney Turpentine Ironbark Forest to near Linksley Avenue, edge sites only  Weeds and garden escapes on upper banks behind houses: at drainage outlets down to creeks	<i>Hills Biodiversity Strategy and generic Bushland Management Plan</i>  <i>NSW TSC Act 1995, Commonwealth EPBC Act 1999</i>  <i>Noxious Weeds Act 1993 (Amended 2005)</i>  <i>SEPP 19 Bushland in Urban Areas</i>	Potential damage to vegetation by clearing for Cycleway  Potential need to remove large trees  Soil disturbance with potential to spread weeds	Reduce width of cycleway path to minimise damage to native bushland.  Do not dispose of native leaf litter & woody debris cleared from track route, but relocate to adjacent bushland  Weed control required prior and post construction
	Sections 1 and 2	<u>Flora Issues:</u>  <i>Epacris purpurascens</i> var. <i>purpurascens</i> & <i>Darwinia biflora</i> .  <i>Assessments of Significance Appendix C</i>  No other threatened species recorded  Species declared as 'noxious plants' under the Noxious Weeds Act 1993 (amended 2005).  Three (3) species are WoNS - <i>Rubus fruticosus</i> (Blackberry), <i>Lantana camara</i> (Lantana), <i>Asparagus</i>	<i>Hills draft Local Environment Plan (2010)</i>  <i>Hills Environmental Management Plan</i>  <i>Hills Biodiversity Strategy (May 2006)</i>  <i>Hills Generic Bushland Plan of Management (2006)</i>	<ul style="list-style-type: none"><li>▪ Potential damage to tree roots in Section 1 due to construction and/or lopping</li><li>▪ No adverse impacts on flora or fauna species listed under TSC Act or EPBC Act</li><li>▪ Long-term and extensive habitat degradation exists, resulting from weed invasion, including noxious weeds &amp; WONS</li><li>▪ Potential for spread of</li></ul>	<ul style="list-style-type: none"><li>▪ Immediate attention to noxious weeds in Construction Corridor</li><li>▪ Soil disturbance to be minimised and runoff down slope contained</li><li>▪ Machinery to be cleaned prior to entry to bushland (wash down) to prevent introduction of weed propagules and soil pathogens from external areas</li><li>▪ Protect remnant trees</li></ul>



Item/Issue	Section Location	Existing Environment	Legal and Policy Considerations	Impact	Measures
		<p><i>asparagoides</i> (Bridal Creeper)</p> <p><u>Fauna Issues:</u></p> <p>Two (2) Vulnerable species were recorded: Eastern Bentwing-bat (<i>Miniopterus schreibersii oceanensis</i>) and Little Lorikeet (<i>Glossopsitta pusilla</i>)</p> <p>Potential habitat also exists for a number of other threatened species. Assessments of Significance see <i>Appendix D</i></p>		<p>soil pathogen <i>Phytophthora cinnamomi</i> during earthworks</p>	<p>wherever possible: avoid removing any hollow-bearing trees</p> <ul style="list-style-type: none"><li>▪ Minimise lopping of overhanging limbs or dead trees adjacent to the cycleway route. Where hollows are present, salvage limb and relocate.</li><li>▪ Attendance by a qualified ecologist is recommended where threatened fauna issues arise.</li></ul>
<b>Comments:</b>	Further impacts on STIF are unlikely to occur as the bush track is already cleared: no further incursions are anticipated. Flora species are located off the track and have been marked to allow for protective fencing to be set in place. Fauna impacts should be minimal but only if habitat trees along the route (especially in Section 3) are protected and retained <i>in situ</i>				



Table 5.4: Overview of Environmental Impacts - Air &amp; Energy

Item/Issue	Section Location	Existing Environment	Legal and Policy Considerations	Impact	Measures
Air & Energy	All Sections in Study Area	Currently no significant air or energy issues known to be associated with the Cycleway Links project and none are anticipated.	<i>Protection of the Environment Operations Act 1997</i>	<p>The major source of air pollution from proposed works will be dust created by the installation of pathways, boardwalks etc, but these are likely to occur only if climatic conditions are especially dry.</p> <p>Dust and other emissions from vehicles during ingress and egress are also likely during construction works.</p> <p>However, the works will be short-term, and it is not anticipated that any associated landscape works post construction will create any air quality problems. The impact of dust on air quality can be minimised if appropriate management actions are undertaken.</p>	<p>Vehicles and machinery entering the bushland reserves to keep to access routes</p> <p>Avoid disturbing, damaging or clearing vegetation from areas other than the immediate construction zone(s), or if unavoidable, stabilise exposed soils as quickly as possible using mulch, erosion control fabric, or a temporary nurse crop.</p> <p>Soil and construction material imported into the Section (if required) is to be stockpiled in a (preferably cleared) site; piles to be contained by 'paraweb' fencing, and covered with black plastic until such time as they are required.</p> <p>Surplus soil &amp; excavated materials to be removed from the site as soon as a full truck load is available.</p>



Table 5.5: Overview of Environmental Impacts - Noise &amp; Vibration

Item/Issue	Site Location	Existing Environment	Legal and Policy Considerations	Impact	Measures
Noise & Vibration	All Sections of Study Area	<p>The Cycleway Link route is located within a bushland setting. Unmade walking track (Section 1) and fire trail (Section 2), but with houses upslope, and often backing onto the proposed Cycleway route. .</p> <p>Sections 3 and 4 are located at some considerable distance from houses, with no overlapping boundaries.</p> <p>Only noise audible to track users in Sections 1 and 2 will be generated by lawn mowers etc during routine maintenance in nearby properties and motor vehicles using local streets.</p>	None	<p>Sources of noise from the proposed Cycleway Links development and any landscape enhancement activities will include:</p> <p>Earthmoving machinery for re-grading of local topography</p> <p>Vehicles and machinery for the construction of concrete cycleways and boardwalks</p> <p>Vehicles and tree planting devices associated with any proposed rehabilitation landscaping works.</p> <p>Bridge construction over Cattai Creek</p>	<p>Works hours to be limited to days and times which do not unduly affect nearby residents</p> <p>Local residents to be given advanced warning of the project and be informed of both the reason for the works and likely duration (mail or letter drops and notice in local newspapers are recommended).</p> <p>The construction contractor will be required to implement Best Practice Measures to reduce noise impacts. As the proposed works are of a relatively minor nature, it is not envisaged that noise monitoring will be required.</p> <p>All contractors to be aware of nearness of works to adjoining residences, and keep noise levels to minimum, especially as they leave and enter the site.</p>



Table 5.6: Overview of Environmental Impacts - Waste Management

Item/Issue	Site Location	Existing Environment	Legal and Considerations Policy	Impact	Measures
Waste Management	All Sections in Study Area	<p>Sites close to suburban roads and around cement drainage swales and outlets contain some accumulated litter and other rubbish.</p> <p>Weeds also present around all drainage outlets (noxious and environmental). Privet stands along Cattai Creek especially dense in Section 4 (Sydney Water)</p> <p>Horticultural introductions and garden escapes behind houses backing onto tracks and fire trail (Sections 1 and 2).</p>	<p><i>Waste Minimisation and Management Act 1995</i></p> <p><i>Noxious Weed Act 1993/Amended 2005</i></p>	<p>Plastic, paper and other litter is snagged in mid-storey vegetation along the creekline; result of high water flows in heavy rain events.</p> <p>Invasion of weeds into bushland below all drainage outlets.</p>	<p>Sites to be cleaned up prior to and following completion of works (rubbish to be removed from cycleway corridor)</p> <p>All waste generated during works including any construction material or surplus fill be contained throughout the duration of works and removed off site.</p> <p>Weed control/bush regeneration works required.</p> <p>A general site cleanup along the creek would be of great benefit. Possible Clean-up Australia Day Project</p>



Table 5.7: Overview of Environmental Impacts - Heritage

Item/Issue	Site Location	Existing Environment	Legal and Considerations	Policy	Impact	Measures
Heritage	Sections 1 and 2	<p>The Cycleway route is in close proximity to modern man-made environments with local roads, tracks, fire trails behind houses, and landscape plantings, areas of fill soils, weeds and pollution.</p> <p>Sections 1 and 2 are close to houses but Section 3 is located in bushland out of sight of houses.</p> <p>No known items of heritage are known to occur.</p>	<i>Heritage Act 1977</i>  <i>National Parks and Wildlife Act 1974</i>	No heritage items listed on THSC Heritage Register.		<p>No measures required at this time however works <i>should not proceed</i> until the absence of Indigenous heritage items is confirmed by AHIMS NSW.</p> <p>Should any items of cultural heritage be uncovered during the works, THSC is to be notified immediately.</p>
Comments:	There are no known items of either Indigenous or European heritage within the Study Area. However, AHIMS lists a number of items on Cattai Creek but there are not within the current Study Area					



Table 5.8: Overview of Environmental Impacts - Traffic &amp; Access

Item/Issue	Site Location	Existing Environment	Legal and Considerations	Policy	Impact	Measures
Traffic & Access	Section 1	<p>Study Area (Section 1) is located between Linksley Avenue and Citadel Crescent (wide grassed fire break at Citadel Crescent).</p> <p>Unmade track in Section 1: uneven, rocky and prone to erosion. Large trees close to the track.</p> <p>Narrow pinch-points (rock outcrops, large trees, short distance to creek)</p>	<i>Roads Act 1993</i> <i>Occupational Health &amp; Safety Act 1983</i>		<p>No impacts in Section 1 and 2.</p>	<p>No measures required for Sections 1 and 2</p> <p>Install warning signs on roads and temporarily reduce speed limit to 50 kph</p>
	All Sections in Study Area	<p>Cycleway route will not cross any major or local roads, being wholly contained along an existing track (Section 1) and a paved fire trail (Section 2).</p> <p>Section 3 is located on a network of unmade tracks down steep rocky slopes to Cattai Creek. Works will have to be carried out by hand</p> <p>The route from Cattai Creek to Rosebery Road is constrained by the escarpment.</p>			<p>Minor impact on traffic on nearby roads where vehicular access, parking or stockpiling is required, but this is only anticipated during the construction period.</p>	<p>Inform local residents of works in advance: mail or letter drops and place notice in local newspapers</p> <p>Fence bushland to restrict vehicle access during construction: exclusion fencing to be maintained for duration of works. Signpost access points and work sites altering pedestrians for safety reasons.</p>



Table 5.9: Overview of Environmental Impacts - Social &amp; Visual

Item/Issue	Site Location	Existing Environment	Legal and Considerations	Policy	Impact	Measures
Social & Visual	Section 1 and Sections 3	Cycleway route located on a network of unmade tracks: narrow, rocky and uneven. Subject to erosion in steep sites and with drainage impacts.	<i>Noxious Weeds Act 1993 (Amended 2005)</i>	None	Ensure removal of all construction debris, excess fill and rubbish Residents living upslope to be notified of requirements of Noxious Weeds Act.	
	Section 2	Cycleway route follows existing paved fire trail.  Some sites around drainage swales and outlets with dumped rubbish and water-borne litter (varying degrees), and other visual pollution.			Unattractive to users and encourages dumping by others: debris in creek interferes with water flows  Proposed works will improve visual amenity. This is likely to occur via construction of formal pathways and removal of dumped rubbish, with weed control along cycleway route in bushland.  Waste generated from works will impact on visual amenity if left on site. Plant and vehicular access associated with works may result in grassed areas becoming degraded.	Ground disturbed by vehicles or other machinery to be stabilised as necessary. Install turf or hydromulch with a sterile nurse crop if disturbance is adjacent to bushland.  Implement appropriate weed management strategies and instigate a clean-up program  Remove all surplus soil and construction materials off-site post works (as above)  Undertaking of the above-listed actions will ensure any impact on visual amenity or after during the project will be minimal.



Table 5.10: Overview of Environmental Impacts - Cumulative Impacts

Item/Issue	Site Location	Existing Environment	Legal and Considerations	Policy	Impact	Measures
Cumulative Impacts	All Sections in Study Area	Weeds, point source soil erosion on creekbanks and along existing tracks (especially Section 1 and Section 3)  Ecological senescence (dead trees) in absence of fire.  Possible damage to trees and importation of weeds caused by urban stormwater runoff at drainage outlets.	THSC land management obligations, e.g.:  <i>Hills draft Local Environmental Plan 2010</i>  <i>Hills Environmental Management Plan</i>  <i>Hills Biodiversity Strategy (May 2006)</i>  <i>Hills Generic Bushland Plan of Management (2006)</i>		Loss or degradation of local vegetation communities unless safeguards are undertaken.  Potential for sedimentation of creekwaters unless works are strictly controlled (soil and water management plan to be prepared)	THSC bushland reserve management plans & management strategies  Weed control and rehabilitation of damaged area post construction to be an integral part of the Cycleway Proposal
Comments:	The Proposal will provide recreational and environmental educational opportunities to the community.					



## 6 CONCLUSIONS, DECLARATION AND SIGN-OFF

A number of factors have been identified relating to the proposed construction of a new Cycleway Link in the Cattai Creek Riparian Corridor. Some of these factors have the potential to impact upon the surrounding environment.

Most importantly, if the Cycleway is constructed close to the banks of Cattai Creek or its unnamed eastern tributary, there may be short-term impacts on creek bank stability and water quality, and longer term impacts which might adversely affect the remnant native bushland within the Corridor. Long-term impacts may include an increased level of weed invasion into bushland and an increase in a number of other Key Threatening Processes.

Two (2) plant communities are dominant within the Study Area: Hinterland Sandstone Gully Forest ('HSGF') and Sandstone Riparian Scrub (SRS). Neither community is listed under the environmental legislation.

A small stand of Sydney Turpentine Ironbark Forest ('STIF') occurs at the far south-eastern end of the Study Area, near Linksley Road and Timber Grove, with another stand on the upper slopes of the fire trail below Ridgecrop Avenue (the latter being ex-Study Area). The Linksley Road stand is unlikely to be further impacted under the Cycleway Proposal as there is an existing bush track which has already been cleared.

Two (2) naturally occurring species of conservation significance were recorded in the Study Area: *Epacris purpurascens* var. *purpurascens* and *Darwinia biflora*. A third species Brush Cherry (*Syzygium paniculatum*) listed under both the *TSC Act* (E1) and *EPBC Act* (V).was also found this occurrence is thought to be a horticultural planting or a garden escape.

Seven-part Tests of Significance indicate that no significant impacts to the STIF or the two (2) threatened flora species listed above will occur as the result of the Cycleway Link construction.

No other species of conservation significance was recorded within the Study Area (UBM Flora and Fauna Report, September 2012).

Two (2) species, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and Little Lorikeet (*Glossopsitta pusilla*) - both listed as 'vulnerable' under the *TSC Act*) - were identified in the Study Area. It is also possible that other threatened fauna species recorded for the Region would utilise the resources of the Study Area or neighbouring properties on occasion for foraging, hunting, nesting or roosting.

Seven-part Tests of Significance carried out for the two (2) threatened fauna and a number of other threatened faunas considered likely to utilise the resources of the Study Area on occasion, indicate that no significant impacts to threatened fauna or their habitats will occur as the result of the Cycleway Link construction



It is therefore considered that, given the implementation of the protective measures outlined in this REF, the proposed works related to the construction of the new Cycleway Link in the Cattai Creek Riparian Corridor will NOT have a significant adverse impact on the environment.

On this basis, there is no need for the preparation of an Environmental Impact Statement or a Species Impact Statement. However, to ensure the works and activities do not cause any of the impacts flagged in the REF, an Environmental Management Plan should be developed for the project by the Proponent which addresses all of the issues highlighted in this REF



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## 8 APPENDICES

### Appendix A: Clause 228 Summary

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* lists the factors to be taken into account when consideration is being given to the likely impact on the environment of an activity. Consideration of those factors for the proposed works in the Cattai Creek Riparian Corridor is summarised below.

Clause 228 Factor	Comment
Any environmental impact on a community	Not significant, net impact beneficial
A transformation of a locality	Will not transform locality
Any environmental impact on the ecosystem of the locality	Not significant
A diminution of the aesthetic, recreational, scientific or other environmental quality or value of the locality	Net impact beneficial
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	Not significant, net effect beneficial
Any impact on the habitat of any protected or endangered fauna (within the meaning of Section 98 of the National Parks and Wildlife Act 1974)	Not significant <i>provided that</i> measures are taken to ensure retention and protection of threatened species and habitat
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	As above Will not endanger flora or fauna provided protective measures are taken
Any long-term effects on the environment	Minor short-term effects only
Any degradation of the quality of the environment	Minor short-term effects only
Any risk to the safety of the environment	No risk to safety
Any reduction in the range of beneficial uses of the environment	Increase in beneficial uses
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	No increased demands on resources Resources for bridge construction will be required
Any pollution of the environment	Minor short-term risk only
Any environmental problems associated with the disposal of waste	No waste disposal issues provided surplus construction material is removed off site at conclusion of works
Any cumulative environmental effect with other existing or likely future activities	Cumulative environmental effects beneficial



## Appendix B: Site Photos

*Plate 1: Section 1 Bush along unmade track from Linksley Avenue to Citadel Crescent*



*Plate 2: Section 1. Pipe across unnamed eastern tributary creek*





*Plate 3: Unnamed eastern tributary with fallen timbers: note proximity of track lower RHS*



*Plate 4: Section 2 Grassed Fire Break behind Citadel Crescent*







*Plate 5: Section 2 paved fire trail behind Ridgecrop Drive*



*Plate 6: Section 2 Bushland and rock outcrops along fire trail*





**Plate 7: Section 3 (Citadel Crescent to Rosebery Road) - Bushland**



**Plate 8: Section 3 – Bush Track**





## Appendix C: – Assessment of Significance – Flora (from UBM September 2012)

Assessments of Significance have been conducted for each of the following flora species or communities known to occur within the Study Area. The impact of the construction of the cycleway from Linksley Avenue to Rosebery Road will be considered in each assessment.

- Sydney Turpentine Ironbark Forest
- *Epacris purpurascens* var. *purpurascens*
- *Dillwynia biflora*

### Sydney Turpentine Ironbark Forest

As required under the NSW (TSC Act) and Commonwealth (EPBC Act) environmental legislation, Assessments of Significance for Sydney Turpentine Ironbark Forest ('STIF') are provided to assess the impacts of the Proposal on this ecological community.

STIF is listed as a *Critically Endangered Ecological Community* ('EEC') under the Commonwealth EPBC Act (1999) and an *Endangered Ecological Community* under the NSW TSC Act (1995)

The current Proposal is construct a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road at Kellyville. The Cycleway route will utilise an already existing bush track between Linksley Avenue and Citadel Crescent and then run along a paved fire trail to Drawbridge Place. The first part of the Cycleway Route traverses the fringes of a stand of STIF, which occurs close to the beginning of the bush track at Linksley Avenue and Timber Grove.

Impacts upon the listed Ecological Community may be Direct Impacts – activities expected to directly affect the listed community e.g. clearing of vegetation, or Indirect Impacts – activities which are expected to affect the listed community indirectly e.g. increases in soil nutrient levels, sedimentation.

The direct impacts on the bushland will depend on the route adopted and the mode of construction used in this first part of the Cycleway route. At the time of writing, the preferred mode of construction is to modify the existing bush track to create a concrete cycleway.

### Commonwealth Legislation

Listing advice provided for the Critically Endangered Ecological Community '*Turpentine Ironbark Forest in the Sydney Bioregion*' by the Commonwealth Department of Sustainability, Environment, Water, Population and Community (DEWHA 2005<sup>8</sup>) provides the following information in relation to the required Condition Classes of STIF:

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<sup>8</sup> DEWHA is now known as SEWPAC – Department of Sustainability Environment Water Population & Communities



*The ecological community is limited to remnants that are relatively intact in condition as outlined below:*

1. *The vegetation contains some characteristic components from all structural layers (tree canopy, small tree/shrub mid-storey, and understorey).*
2. *Tree canopy cover is greater than 10% and remnant size is greater than one (1) hectare. These areas have the greatest conservation value and their high quality and size makes them most resilient to disturbance.*
3. *However, remnants with tree canopy cover less than 10% are also included in the ecological community, if the fragments are greater than one (1) hectare in size and occur in areas of native vegetation in excess of five (5) hectares in area. These areas enhance the potential for connectivity and viability of the ecological community. They support native flora and fauna species by facilitating gene flow among remnants and buffering against disturbance.*

The ecological community as described in the *EPBC Act* specifically excludes patches where either the native mid-storey/understorey or native canopy trees are absent. Occurrences of isolated single trees or shrubs characteristic of the ecological community also are excluded from the ecological community. Although these degraded remnants may have some value as biodiversity reservoirs, the structure of these patches has been so severely modified, that they fall outside the definition of the ecological community.

The small stand of STIF at Linksley Avenue/Timber Grove at Glenhaven is not one (1) hectare or greater in size, occurring as small patches of remnant vegetation on the ridges and upper slopes of the unnamed eastern tributary creek in this part of the Study Area. The large canopy trees *Syncarpia glomulifera* (Sydney Turpentine), are however characteristic of the STIF ecological community and they contribute to a native tree canopy which provides fauna habitat for urban-tolerant species which are known to occur in the Locality and Region.

#### **NSW State Legislative Considerations – the Seven-part Test**

An Assessment of Significance ('Seven-part Test') under Section 5A of the *Environmental Planning and Assessment Act 1979* is designed to determine "*whether there is likely to be a significant effect on threatened species, populations, ecological communities or their habitats*" (as listed on the Schedules of the *NSW TSC Act*), and consequently, to determine whether a Species Impact Statement is required (see Final Determination for Sydney Turpentine Ironbark Forest ('STIF') in Appendix 3).

The current Proposal is construct a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road at Kellyville. The Cycleway route will utilise an already existing bush track between Linksley Avenue and Citadel Crescent and then run along a paved fire trail to Drawbridge Place. The first part of the Cycleway Route traverses the fringes of a stand of STIF, which occurs close to the beginning of the bush track at Linksley Avenue and Timber Grove.

The direct impact on STIF will depend on the route adopted and the mode of construction used in this part of the Cycleway route. At the time of writing, the preferred mode of construction is to modify the existing bush track to create a concrete cycleway.



The following Assessment of Significance has been undertaken in relation to the potential impact of the Proposal to construct a Cycleway Link through a small stand of STIF at Linksley Avenue/Timber Grove Glenhaven.

*(a).....in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

No threatened species listed under the Schedule 1, Part 1 of the *Threatened Species Conservation Act 1995 (TSC Act)* were recorded in or directly adjacent to the stand of SIF in the Study Area. Therefore the Proposal will not disrupt the lifecycle of a viable threatened species such that it would be significantly compromised.

*(b) .... in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

No endangered populations listed on Schedule 1 (Part 2) of the NSW *TSC Act* were recorded within or directly adjacent to the Study Area. Therefore, the Proposal will not disrupt the lifecycle of a viable threatened species population such that it would be significantly compromised.

*(c)....in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

The proposed Cycleway Link will be located over an existing bush track, which itself has been formed over the sewer line easement on the eastern side of an unnamed tributary of Cattai Creek. The bush track is 1.5-2 metres in width and extends from Linksley Avenue/Timber Grove to Citadel Crescent.

The subject stand of STIF is confined to a very small area along the upper creekbanks at the beginning of the bush track, and does not extent to Citadel Crescent (see *Figure 2.3*) of this Report. The narrow bush track is a long-standing structure (estimated to be 15-20 years) along the unnamed eastern tributary and serves to provide an area of passive recreation for local residents.

The Proposal will not reduce the extent of the STIF ecological community as the ecological community occurs on the upper banks and the bush track is on the lower slopes close to the creek. Therefore no part of the ecological community will be removed or otherwise damaged, and there is not expected to be any direct or indirect impacts on this remnant as a result of the Proposal. Therefore it is considered that the Proposal will not contribute to placing this Endangered Ecological Community (EEC) at further risk of extinction, and no reduction in extent of this community within the Locality is expected.

*(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*



The STIF ecological community occurs on the upper banks of the unnamed eastern tributary creek while the bush track is on the lower slopes close to the creek; traversing an area described as Sydney Sandstone Gully Forest. No trees are to be removed within the Study Area and no direct or indirect impacts are anticipated under the Proposal. Therefore it is considered that the Proposal would not substantially or adversely modify the composition of the STIF ecological community such that it would be placed at the risk of extinction.

*(d)...in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed,*

The Cycleway Link will utilise the footprint of the existing bush track in this first section of the route, which is already cleared to a width of 1.5 to 2 metres. The Cycleway will follow the 'line of best fit' and no indigenous trees are to be removed as part of the Proposal. Minor encroachment into bushland on either side of the bush track may be necessary to stabilise track edges and/or to provide protection for geological features and trees. However, no area of STIF is likely to be significantly impacted. Therefore the Proposal is therefore unlikely to modify existing habitat within this stand of the STIF ecological community.

*(ii)... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action,*

The Cycleway Link will utilise the footprint of the existing bush track in this first section of the route, an area which is already cleared. *Syncarpia glomulifera* (Sydney Turpentine) occur on both sides of the unnamed eastern tributary creek, but these characteristic STIF trees do not extend further downstream where the vegetation is mapped as Hinterland Sandstone Gully Forest and as Riparian Scrub (both communities are based on sandstone geology, not shale).

STIF in the Locality is already fragmented by roads and residential development of some years standing. Connectivity via the canopy occurs through a number of large trees in the gully and other trees on neighbouring streets and in private properties. All STIF trees are to be retained and are unlikely to be impacted under the Proposal. The Proposal is therefore unlikely to result in any area of habitat being further fragmented or isolated from other areas of habitat.

*(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

Stands of *Syncarpia glomulifera* (Sydney Turpentine) occur on the upper slopes on both sides of the gully of the unnamed eastern tributary creek. As the existing bush track (whether to be upgraded or paved) does not traverse though an area of STIF bushland. The Cycleway Link will utilise the footprint of the existing bush track in this first section of the route, an area which is already cleared.

The canopy layer provided by the remnant STIF tree species on the slopes provides habitat for a variety of urban-tolerant native and introduced fauna, especially birds and arboreal mammals, and possibly microbats. However, the habitat provided by these large canopy trees is not



unique, and similar habitat is provided by other large trees within the Study Area and by numerous other trees on neighbouring properties and those planted as street trees.

None of these trees will be removed or impacted upon by the Proposal.

*(e) ....whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

No habitats considered critical to threatened plant species, populations or ecological communities previously recorded in the Region occur within, or in close proximity to the Study Area.

The Study Area is not listed as 'critical habitat' under Part 3 Division 1 of the *TSC Act*.

*(f).....whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No Recovery Plans or Threat Abatement Plans (either finalised or draft) are relevant to the STIF within the Study Area, Locality or Region.

*(g)....whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The KTP 'clearing of native vegetation' may be applicable to the Proposal to create a Cycleway Link over an existing bush track. Minor clearing on track edges may be required, although it is not known at this time how much area will be impacted.

None of the other identified Key Threatening Processes<sup>9</sup> listed under Schedule 3 of the *TSC Act*, would be applicable to this Proposal.

However, one Key Threatening Process that may be relevant, particularly if machinery hygiene is not adequate, is infection by the soil pathogen *Phytophtohora cinnamomi*. In order to guard against this KTP, it is recommended that all machinery entering the site be thoroughly cleared, especially if such machinery has been used in weedy or otherwise contaminated sites previously.

Further, all native canopy trees along the existing bush track in this part of the Study Area will be protected during construction works. Of particular importance is the prevention of movement by soil and/or water from the construction site downslope into the bushland and the nearby watercourse (the unnamed eastern tributary creek) as this could introduce *Phytophtohora cinnamomi* activated by earthworks.

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<sup>9</sup> Key Threatening Process has the same meaning as in the NSW *TSC Act* subject or to section 5C, Part 7A of the NSW *Fisheries Management Act 1994*.



**Therefore, giving consideration to Section 5(A) of the State *Environmental Planning and Assessment Act 1979*, it is considered that the matter WOULD NOT require a referral to the Director General Environment & Heritage and the preparation of a Species Impact Statement for Sydney Turpentine Ironbark Forest**

### **Epacris purpurascens var. purpurascens**

#### **NSW State Legislative Considerations**

A Seven-part Test of Significance under Section 5A of the *Environmental Planning and Assessment Act 1979* is designed to determine "whether there is likely to be a significant effect on threatened species, populations, ecological communities or their habitats" (as listed on the Schedules of the *NSW TSC Act*), and consequently to determine whether a Species Impact Statement is required.

The current Proposal is construct a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road at Kellyville. The Cycleway route will utilise an already existing bush track between Linksley Avenue and Citadel Crescent (Section 1) and then run along a paved fire trail to Chainmail Crescent (Section 2). Stage 3 of the Cycleway Link from Chainmail Crescent to a point approximately opposite the end of Rosebery Road (on the far side of Cattai Creek) will be constructed at a later date.

*Epacris purpurascens* var. *purpurascens* has been recorded for bushland in the current Study Area: two (2) specimens in Stage 1 and one (1) specimen in Stage 2 (see *Figure 3.1*). *Epacris purpurascens* var. *purpurascens* is a threatened shrub listed under the *TSC Act*; therefore carrying out this Test is a requirement of the legislation.

The direct impact on the threatened *Epacris* will depend on the final width of the Cycleway Link (as modified) and the mode of construction. At the time of writing, the preferred mode of construction is to modify the existing unmade bush track between Linksley Avenue/Timber Grove and Citadel Crescent to create a concrete cycleway. The existing paved fire trail will be upgraded where necessary and erosion points repaired, but it will remain substantially unchanged.

The following Assessment of Significance has been undertaken in relation to the potential impacts of the Cycleway Link Proposal on the threatened *Epacris purpurascens* var. *purpurascens* which occurs in Section 1 (Linksley Avenue/Timber Grove to Citadel Crescent, and Section 2 (Citadel Crescent to Chainmail Crescent. There were no threatened species recorded for Stage 3 (Chainmail Crescent to a point opposite and/or downstream of Rosebery Road).

### **Epacris purpurascens var. purpurascens**

*(a)... in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

A threatened plant – *Epacris purpurascens* var. *purpurascens* – has been recorded within the Study Area. Three (3) individuals were recorded in close proximity to the existing bush track (Stage 1) and adjacent to the existing fire trail (Stage 2) (see *Figure 3.1*). As suitable habitat is



found elsewhere in the Study Area, it is likely that other plants occur in bushland on the slopes away from the existing track and fire trail.

As these three (3) individuals are growing in close proximity to the existing track and fire trail, unless protective measures are taken it is possible that these plants will be damaged during construction of the Cycleway Link.

In preparing this Assessment, it has been assumed that measures will be set in place to protect the threatened Epacris (including temporary fencing and notification to contractors). Ideally, no works should be undertaken within three to five metres of the Epacris, although it is recognised that this may not be possible. Given this assumption, and given that other plants are likely to occur in the local bushland, the proposed Cycleway Link development is not expected to cause the local extinction of the species.

*(b)... in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

No endangered flora populations listed on Schedule 1 (Part 2) of the NSW TSC Act were recorded within the Study Area. Therefore, the proposed Cycleway Link development is not expected to disrupt the lifecycle of a viable threatened species population such that it would be significantly compromised.

*(c)... in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i)... is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

A threatened ecological community listed under the TSC Act (STIF) was recorded within the Study Area. This has been considered in a separate Seven-part Test.

*(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

See Part c(i).

*(d)... in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*

The existing bush track and paved fire trail have been in place for some years (at least 15-20 years). These tracks have been cleared of native vegetation and maintained as open thoroughfares through constant use by pedestrians and cyclists. The fire trail is also maintained by Council staff.



With the exception of small edge sites along the bush track which might be impacted by the need to reinforce edges and/or protect geological features and large trees, no clearing of the threatened *Epacris* habitat is anticipated. Modification is therefore expected to be minimal.

It is acknowledged that runoff from the paved (concrete) surface in Section 1 of the route may increase soil moisture levels on track edges, but as the recorded *Epacris* individuals are growing upslope of the bush track and fire trail, no such impact is anticipated.

As mentioned previously in Part (a), it is expected that the *Epacris purpurascens* var. *purpurascens* recorded in close proximity to the existing bush track and fire trail will be protected by creating a protective “Conservation Zone” around each plant, and that no intrusion into these Zones will be allowed.

*(ii) ...whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The existing bush track and paved fire trail have been in place for some years (at least 15-20 years). These tracks have been cleared of native vegetation and maintained as open thoroughfares through constant use by pedestrians and cyclists. The fire trail is also maintained by Council staff.

The three (3) *Epacris* individuals recorded for the Study Area were found growing upslope of the bush track and fire trail, in areas where no further vegetation clearing is anticipated: as such, no fragmentation of habitat is anticipated

*(iii)... the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

As mentioned above, the three (3) *Epacris* individuals recorded for the Study Area were found growing upslope of the bush track and fire trail, in areas where no further vegetation clearing is anticipated: as such, no fragmentation of habitat is anticipated.

As the route of the proposed new Cycleway Link has already been cleared for some years (Stage 1 – unmade bush track; Stage 2 -paved fire trail), no further areas of habitat or potential habitat will be impacted, and no area of habitat will be removed, modified, fragmented or isolated as the result of the Proposal.

*(e) ...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

No habitats considered critical to *Epacris purpurascens* var. *purpurascens* occur within, or in close proximity to, the Study Area. Land in the Cattai Creek Riparian Corridor is not listed as ‘critical habitat’ under Part 3 Division 1 of the *TSC Act*.

*(f) ...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*



No Recovery Plans or Threat Abatement Plans (both finalised and draft) are relevant to the *Epacris purpurascens* var. *purpurascens* within the Study Area. Many of the priority actions that have been determined by the DEC<sup>10</sup> (2006) for the management of *Epacris purpurascens* var. *purpurascens* are already being implemented.

The recovery strategies for the species recommended by DECC (2007) are:

- Fire intervals of 10-15 yrs (where there are no needs for asset protection zones); and
- Prevent further loss and fragmentation of habitat.

The recommended fire intervals would be very difficult to implement due to the presence of residential housing on both sides of the Riparian Corridor.

*(g) ...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

Of the identified Key Threatening Processes listed under Schedule 3 of the *TSC Act*, “clearing of native vegetation” would not be applicable as the level of native vegetation clearance proposed is minimal and will be restricted to edge sites (where necessary). Provided that protective measures are set in place to identify and exclude access to the three (3) threatened Epacris recorded along the Cycleway Link route, there will be no adverse effect on the local population of *Epacris purpurascens* var. *purpurascens*.

There are several Key Threatening Processes that may be relevant to the associated works, particularly if machinery hygiene is not sufficient and disease and/or weed seed is imported into the subject site.

These Key Threatening Processes include: infection by *Phytophtohora cinnamomi*; infestation by exotic perennial grasses, exotic vines and scramblers, Lantana or Bitou Bush/Boneseed.

To avoid these threatening processes, machinery will need to be cleaned prior to working in areas that are in, or adjacent to native vegetation.

The control of weeds (especially woody weeds) also forms part of the recovery strategy plan for *Epacris purpurascens* var. *purpurascens*. UBM recommends that targeted weed control/bush regeneration works along the route of the Cycleway Link be undertaken prior to the commencement of construction. The location of Linksley Road at the head of a small sub-catchment of Cattai Creek provides an ideal opportunity to control weeds and protect local biodiversity values.

**Therefore, giving consideration to the requirements of the NSW *Environmental Planning and Assessment Act 1979*, it is considered that the matter would NOT require referral to the Director General Environment & Heritage and the preparation of a Species Impact Statement for *Epacris purpurascens* var. *purpurascens*.**

<sup>10</sup> Now DECC



### *Darwinia biflora*

#### NSW State Legislative Considerations

A Seven-part Test of Significance under Section 5A of the *Environmental Planning and Assessment Act 1979* is designed to determine "whether there is likely to be a significant effect on threatened species, populations, ecological communities or their habitats" (as listed on the Schedules of the *NSW TSC Act*), and consequently to determine whether a Species Impact Statement is required.

The current Proposal is construct a Cycleway Link between Linksley Avenue Glenhaven and Rosebery Road at Kellyville. The Cycleway route will utilise an already existing bush track between Linksley Avenue and Citadel Crescent (Section 1) and then run along a paved fire trail to Chainmail Crescent (Section 2). Stage 3 of the Cycleway Link from Chainmail Crescent to a point approximately opposite the end of Rosebery Road (on the far side of Cattai Creek) will be constructed at a later date.

A population of about 50 individuals of *Darwinia biflora* has been recorded in Stage 2 of the current Study Area; located in bushland on the south-western side of the fire trail which runs behind Ridgecrop Drive (see *Figure 3.1*). *Darwinia biflora* is a shrub listed as 'Vulnerable' under both the *TSC and EPBC Acts*; therefore carrying out an Assessment of Impacts is a requirement of the legislation.

The impacts of the Proposal on the population of *Darwinia biflora* in bushland along the paved fire trail are expected to be minimal, and given their location away from the fire trail, probably will not occur at all. The existing paved fire trail will be upgraded where necessary and erosion points repaired, but it will remain substantially unchanged.

The following Assessment of Significance has been undertaken in relation to the potential impacts of the Cycleway Link Proposal on the vulnerable shrub *Darwinia biflora* which occurs in Section 2 (Citadel Crescent to Chainmail Crescent) of the proposed Cycleway Link in the Cattai Creek Riparian Corridor. *Darwinia biflora* was not recorded in either of Stage 1 or 3 of the proposed Cycleway route.

**NOTE:** UBM has not carried out the Assessment under the Commonwealth EPBC Act Assessment Guidelines as the species is considered not to be in the area likely to be impacted. The relevant issues are adequately addressed in the Seven-part Test (below).

#### *Darwinia biflora* – a vulnerable shrub

*(a)... in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

*Darwinia biflora*, listed as 'vulnerable' has been recorded within the Study Area. A large population of about 50 individuals occurs in bushland on the south-western side of the existing fire trail which runs behind Ridgecrop Drive (see *Figure 3.1*). As suitable habitat is found elsewhere in the Study Area, it is possible that other plants are present, although they would more likely occur closer to the ridgelines, on the shale soil geology).



As the population of *Darwinia biflora* is not found on the edges of the fire trail, but further away in undisturbed bushland, it is unlikely that upgrading of or repairs to the fire trail will impact on the extant population.

Nevertheless, in preparing this Assessment, it has been assumed that measures will be set in place to protect the threatened *Darwinia* (including temporary fencing and notification to contractors). Ideally, no works should be undertaken within three to five metres of the *Darwinia*. Given this assumption, and given that other plants are likely to occur in the local bushland, the proposed Cycleway Link Proposal is not expected to cause the local extinction of the species.

*(b)... in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

A species listed as 'vulnerable', *Darwinia biflora*, has been recorded within the Study Area. A large population of about 50 individuals occurs in bushland on the south-western side of the existing fire trail which runs behind Ridgecrop Drive (see *Figure 3.1*). As suitable habitat is found elsewhere in the Study Area, it is possible that other plants are present, although they would more likely occur closer to the ridgelines, at the interface of the sandstone and shale geology.

As the population of *Darwinia biflora* is not found on the edges of the fire trail, but further away in undisturbed bushland, it is unlikely that upgrading of or repairs to the fire trail (where required) will impact on the extant population.

No endangered flora populations listed on Schedule 1 (Part 2) of the NSW TSC Act were recorded within the Study Area. Therefore, the proposed Cycleway Link development is not expected to disrupt the lifecycle of a viable threatened species population such that it would be significantly compromised.

*(c)... in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i)... is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

A threatened ecological community listed under the TSC Act (STIF) was recorded within the Study Area. This has been considered in a separate Seven-part Test.

*(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

See Part c(i).



*(d)... in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*

The paved fire trail has been in place for some years (at least 15-20 years). The fire trail is formed of decomposed granite and has been cleared for a width of 4-5 metres. It is maintained by Council staff.

With the exception of some site where minor repairs are needed to attend to erosion points or ‘blowouts’ near drainage lines, no construction work is proposed for the fire trail. The existing decomposed granite surface is in good repair, and there is at this time, no proposal to concrete the surface. The Cycleway Link at this point will not impact on the population of *Darwinia biflora*.

Nevertheless, it is expected that the population of *Darwinia biflora* on the south-west side of the fire trail will be protected by creating a protective “Conservation Zone” around the population, and that no intrusion into this Zone will be allowed.

*(ii) ...whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*

The existing bush track from Linksley Avenue and the paved fire trail behind Ridgecrop Drive have been in place for some years (at least 15-20 years). These tracks have been cleared of native vegetation and maintained as open thoroughfares through constant use by pedestrians and cyclists. The fire trail is maintained by Council staff.

The population of *Darwinia biflora* growing on the south-western side of the fire trail is located in bushland; not on the track edges. Therefore any damage to these plants is unlikely. As no vegetation clearing in the vicinity of the population will occur, no fragmentation or isolation of habitat is anticipated.

*(iii)... the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

As mentioned above, the population of *Darwinia biflora* recorded for the Study Area was found growing on the south-western side of the existing fire trail, in areas where no vegetation clearing will occur: as such, no fragmentation of habitat is anticipated.

As the route of the proposed new Cycleway Link has already been cleared for some years, no further areas of vegetation will be impacted, and no area of habitat will be removed, modified, fragmented or isolated as the result of the Proposal.

*(e) ...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*



No habitats considered critical to the survival of *Darwinia biflora* occur within, or in close proximity to, the Study Area. Land in the Cattai Creek Riparian Corridor is not listed as 'critical habitat' under Part 3 Division 1 of the *TSC Act*.

*(f) ...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

The Approved Recovery Plan for *Darwinia biflora* has been prepared by the former Department of Environment & Conservation (2004). Many of the priority actions determined by DEC<sup>11</sup> (2004) for the recovery and management of *Darwinia flora* are already being implemented (e.g. legislative protection of known sites, appropriate management).

Fire is an important factor in the life cycle of this species. Fire kills all plants, but also produces a flush of germination from seed stored in the soil. The number of individuals at a site will decline with time since fire, as the surrounding vegetation develops. The fire regime for the management of native vegetation in the Cattai Creek Riparian Corridor is not known.

*(g) ...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

There is one (1) KTP directly relevant to the associated works, particularly if vehicles and other machinery hygiene are inadequate and disease and/or weed seed is imported into the Study Area. This is infection of tree and shrubs by the root rot fungus *Phytophthora cinnamomi*.

To avoid this KTP, vehicles and machinery will need to be cleaned prior to working in areas that are in, or adjacent to native vegetation.

The control of weeds (especially woody weeds) also forms part of the recovery strategy plan for *Darwinia biflora*. UBM recommends that targeted weed control/bush regeneration works along the route of the Cycleway Link be undertaken prior to the commencement of construction.

**Therefore, giving consideration to the requirements of the NSW Environmental Planning and Assessment Act 1979, it is considered that the matter would NOT require referral to the Director General Environment & Heritage and the preparation of a Species Impact Statement for *Darwinia biflora***

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<sup>11</sup> Now DECC



## Appendix D: Assessments of Significance - Fauna (from UBM September 2012)

The cycleway construction in Sections 1 and 2 (see *Figure 3.2*) are not expected to have any significant impact on adjacent bushland. The proposed cycleway in Section 3 will be approximately 250 meters in length and impact on less than one (1) hectare of native vegetation.

As such, an Assessment using the criteria ('Seven-part Test') provided under Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken for this species. These criteria are used to determine "whether there is likely to be a significant effect on this species, its populations, ecological communities or habitats", and consequently whether a Species Impact Statement is required.

Each Seven-part Test of Significance for the following fauna species considers the impact of the construction of a cycleway from Linksley Avenue Glenhaven to Rosebery Road at Kellyville. Some species have been combined based on their similar habitat requirements.

- Little Lorikeet (*Glossopsitta pusilla*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Powerful Owl (*Ninox strenua*)
- Microbats: Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) and Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)

### Little Lorikeet

The **Little Lorikeet (*Glossopsitta pusilla*)** is listed as 'Vulnerable' under Schedule 2 of the *TSC Act*. Two (2) individuals were observed in the tree canopy above the Study Area and a potential nest in a tree hollow was indentified in Section 3 of the Study Area.

The Little Lorikeet forages primarily in the canopy of open Eucalypt forests and woodlands and is often found in riparian habitats. Nesting sites are small hollows positioned high above the ground, usually in smooth-barked Eucalypts. Repeated use of nesting sites suggests there are few available.

*(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."*

There are suitable nesting and foraging sites available for the Little Lorikeet in the vegetation along the length of the cycleway. The cycleway construction will impact on less than 1 ha of bushland considered of value to the Little Lorikeet. It is not anticipated that any hollow-bearing trees (and therefore nesting sites) will be removed. The remainder of the bushland in the Locality will remain unaffected, making the cycleway construction unlikely to place the species at risk of extinction.



*(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."*

An endangered population is defined under the *TSC Act* as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of this species listed under the Act.

*(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) ..is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."*

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. Therefore, not applicable to a threatened species.

*(d) "...in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and*

*(ii) ... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action..., and*

*(iii)...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality...*

The cycleway construction will impact less than 1 ha of native bushland that could be considered of value to the Little Lorikeet but it will retain the remaining bushland considered to be of equal value. Vegetation removal for the cycleway construction will not prevent the Little Lorikeet from moving along the Cattai Creek riparian corridor. The removal of this small area (<1 ha) of bushland within the Study Area is unlikely to impact on the long-term survival of the Little Lorikeet within the Locality or Region.

*(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."*

The Study Area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*. Therefore, no critical habitat would be adversely affected by the Proposal.

*(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."*

No Recovery Plans or Threat Abatement Plans (either finalised or draft) have been prepared for the Little Lorikeet.



(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."

Currently 27 Key threatening processes are defined under Schedule 3 of the *TSC Act*. The Proposal would include the clearing of an area of native vegetation (<1ha); this being listed as a Key Threatening Process.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

It is recommended that the largest possible area of bushland within the Study Area remains undisturbed to minimise the impact of key threatening processes.

#### **Expected impact on the Little Lorikeet**

The cycleway construction will remove a small amount of habitat (<1 ha) that could be utilised by the Little Lorikeet for nesting and foraging. The remainder of the bushland within the Study Area, also considered of value to the species, will remain unaffected.

Given the small area of vegetation to be removed, and the much large area of vegetation available, it is unlikely that the cycleway construction will have a detrimental effect on Little Lorikeet individuals or populations that may utilise the Study Area.

**It is not considered that the proposed construction of a Cycleway Link between Linksley Avenue and Rosebery Road would have a significant impact on the Little Lorikeet, its populations or habitats. Therefore, the preparation of a Species Impact Statement that further considers the impacts of the cycleway construction on these species is NOT REQUIRED.**

#### **Varied Sittella**

The **Varied Sittella** (*Daphoenositta chrysoptera*) is listed as 'Vulnerable' under Schedule 2 of the *NSW TSC Act 1995*. Although not detected in the current field investigations, there are records of the species occurring within one (1) kilometre of the Study Area.

The Varied Sittella is sedentary, inhabiting eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland (OEH 2012). They build nests high in the tree canopy and often use the same nesting site in successive years.

(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."

There are suitable nesting and foraging sites available for the Varied Sittella in the vegetation along the length of the cycleway. The cycleway construction will impact on less than 1 ha of bushland considered of value to the Varied Sittella. The remainder of the bushland in the



Locality will remain unaffected, making the cycleway construction unlikely to place the species at risk of extinction.

*(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."*

An endangered population is defined under the *TSC Act* as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of this species listed under the Act.

*(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) ..is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii).. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."*

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. Therefore, not applicable to a threatened species.

*(d) "...in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and*

*(ii) ... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action..., and*

*(iii)...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality...*

The cycleway construction will impact less than 1 ha of native bushland that could be considered of value to the Varied Sittella but it will retain the remaining bushland considered to be of equal value. Vegetation removal for the cycleway construction will not prevent the Varied Sittella from moving along the Cattai Creek riparian corridor. The removal of this small area (<1 ha) of bushland within the Study Area is unlikely to impact on the long-term survival of the Varied Sittella within the Locality or Region.

*(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."*

The Subject Property is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*. Therefore, no critical habitat would be adversely affected by the Proposal.

*(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."*



No Recovery Plans or Threat Abatement Plans (either finalised or draft) have been prepared for the Varied Sittella.

*(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."*

Currently 27 Key threatening processes are defined under Schedule 3 of the *TSC Act*. The Proposal would include the clearing of an area of native vegetation (<1ha); this being listed as a Key Threatening Process.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

It is recommended that the largest possible area of bushland within the Study Area remains undisturbed to minimise the impact of key threatening processes.

#### **Expected impact on the Varied Sittella**

The cycleway construction will remove a small amount of habitat (<1 ha) that could be utilised by the Varied Sittella for nesting and foraging. The remainder of the bushland within the Study Area, also considered of value to the species, will remain unaffected.

Given the small area of vegetation to be impacted (<1 ha), and the much large area of vegetation to be retained, it is unlikely that the draft Proposal will have a detrimental effect on Varied Sittella individuals or populations that may use the Study Area.

**It is not considered that the proposed construction of a Cycleway Link between Linksley Avenue and Rosebery Road would have a significant impact on the Varied Sittella, its populations or habitats. Therefore, the preparation of a Species Impact Statement that further considers the impacts of the cycleway construction on these species is NOT REQUIRED.**

#### **Powerful Owl**

The **Powerful Owl** (*Ninox strenua*) is listed as 'Vulnerable' under Schedule 2 of the NSW *TSC Act* 1995. There are records of the species occurring less than one (1) km from the Study Area.

Tree hollows are particularly important for all forest owl species. They not only provide habitat for hollow-dwelling arboreal marsupials (possums and gliders), which comprise a large proportion of the owl's diet, but are also potential nesting sites. Estimates of the home range of the Powerful Owl are between 400 – 1450 hectares (OEH 2012).

*(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."*



There is some potential for the Powerful Owl to utilise the resources of the Study Area for hunting and nesting. The proposed cycleway construction in Section 3 will impact on less than one (1) hectare of native vegetation. The proposed subdivision is not likely to impact on populations of suitable prey (prey species including possums, rabbits and birds). Due to the high mobility and large home range of the Powerful Owl, it is unlikely the cycleway construction will have an adverse effect of the life cycles or place any local populations of the Powerful Owl at risk of extinction.

*(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."*

An endangered population is defined under the *TSC Act* as 'a population specified in Part 2 of Schedule 1'. The Powerful Owl is not listed as an endangered population.

*(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

*(i) ..is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."*

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. Therefore, not applicable to this threatened species.

*(d) "...in relation to the habitat of a threatened species, population or ecological community:*

*(i)... the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and*

*(ii) ... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action..., and*

*(iii)...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality...*

The cycleway construction will impact on less than 1 ha of native vegetation considered of value to the Powerful Owl. The removal of this area of potential habitat is unlikely to impact on the long-term survival of the Powerful Owl within the Locality or Region.

*(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."*

The Study Area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*. Therefore, no critical habitat would be adversely affected by the Proposal.



*(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."*

A Recovery Plan has been developed for large Forest Owls (including the Powerful Owl). Two (2) of the main issues identified in these Recovery Plans are clearing and fragmentation of habitat.

The construction of the cycleway is not expected to have a significant impact on the resources available to the Forest Owls as other areas of hunting habitat are available in the Locality and Region. The remainder of the bushland in the Cattai Creek riparian zone will remain intact and it is not expected that any large hollow-bearing trees will be removed.

To date, there is no threat abatement plan for the Powerful Owl.

*(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."*

Currently 32 Key threatening processes are defined under Schedule 3 of the TSC Act. The cycleway construction would impact on less than 1 hectare of native vegetation. Clearing of native vegetation is listed as a Key Threatening Process).

Care should be taken in cycleway construction so that other key threatening processes such as the introduction and spread of weeds such as Bitou Bush, Lantana, exotic vines and scramblers are accelerated. The existing vegetation along Cattai Creek is degraded and infested with woody weeds such as privet.

No other key threatening processes are relevant to the protection of the threatened Owls which might utilise the resources of the Study Area for hunting or nesting purposes.

It is recommended that the smallest possible area of native vegetation is impacted during cycleway construction to minimise the impact of key threatening processes.

#### **Expected impact on Forest Owls**

The construction of a cycleway from Linksley Avenue to Rosebery Road is expected to impact on less than one (1) hectare of native vegetation. It is not anticipated that any hollow-bearing trees will be removed. The remainder of the bushland along the length of the cycleway will not be impacted.

Due to the high mobility and large home range of Powerful Owl, which will allow them to hunt over a wide area, it is unlikely these events will have a significant detrimental effect on the Powerful Owl individuals or populations that have potential to use the resources of the Study Area.

**It is not considered that the proposed construction of a Cycleway Link between Linksley Avenue and Rosebery Road would have a significant impact on the Powerful Owl, its populations or habitats. Therefore, the preparation of a Species Impact Statement that further considers the impacts of the cycleway construction on these species is NOT REQUIRED.**



## Microchiropteran Bats

The **Eastern Bentwing-bat** (*Miniopterus schreibersii oceanensis*), **Eastern False Pipistrelle** (*Falsistrellus tasmaniensis*) and **Eastern Freetail-bat** (*Mormopterus norfolkensis*) have been grouped on the basis of their similar habitat requirements. All species are listed as 'Vulnerable' under Schedule 2 of the *TSC Act 1995*. Only the Eastern Bentwing-bat was detected during the current field investigations, however, there is potential that other species may also utilise the resources of the Study Area on occasion. Each of these species has been recorded previously within 2 km of the Study Area.

These three (3) species of microchiropteran bats ('microbats') are insectivorous, and generally occur in tall woodland (forest) habitats. Potential foraging habitat for these species occurs along the length of the Study Area.

The construction of the cycleway is likely to impact on less than one (1) ha of potential foraging habitat for these microbat species as well as some trees with stringy or fibrous bark suitable for the roosting needs of the Eastern Freetail-bat. Some of these trees may contain small hollows or scars which may be utilised by these microchiropteran species. It is expected that no large hollow-bearing trees will be removed. Some caves and rock crevices suitable for the nesting of the Eastern Bentwing-bat or Greater Broad-nosed Bat were recorded within or nearby the Study Area.

*(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."*

Microbats were detected utilising the Study Area for foraging purposes, mainly on edge sites or in 'flyways' created by openings or tracks through the bushland.

It is expected that post-construction, these species would continue to forage in the Study Area, utilising much the same habitat types as previously. Given the small area of vegetation to be impacted (<1ha) and the species' high mobility, it is unlikely that the cycleway construction would have a significant impact on a viable local population of these microchiropteran bats.

Some of the small hollows and tree scars may provide suitable roosting habitat for the Eastern Freetail-bat; however, there are a number of other suitable habitat trees available in the portion of bushland to be retained.

*(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."*,

An endangered population is defined under the *TSC Act* as 'a population specified in Part 2 of Schedule 1'. At the present time, there are no endangered populations of microchiropteran bat species listed under the Act.

*(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*



*(i)... is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

*(ii)... is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."*

Not applicable to a threatened species.

*(d) "...in relation to the habitat of a threatened species, population or ecological community:*

*(i) ...the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and*

The cycleway construction will impact on less than 1 ha of native vegetation within which there are trees with fibrous or stringy bark and small hollows which may potentially be used by microchiropteran bats as habitat. Other trees would be used for foraging purposes on occasion although it is anticipated that no large hollow-bearing trees will be removed.

The remainder of the vegetation adjacent to the cycleway route provides suitable habitat for the threatened microbats and will not be impacted during the construction process.

*(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and*

Microchiropteran bats can easily negotiate open areas and given the limited size of the habitat to be cleared (<1ha), this loss is not expected to result in the disturbance to the bats' foraging patterns. The possible roosting (i.e. hollows for the Eastern Freetail-bat) and foraging sites within the Study Area will still be connected to other foraging and roosting in the Locality and Region.

*(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."*

The clearing of less than 1 ha of bushland within the Study Area will remove some trees with fibrous or stringy bark and others with small scars or hollows that may be used for roosting, by the threatened microbats.

Although this area of potential foraging habitat would be removed for the cycleway construction, this vegetation is part of network of riparian corridors along the Cattai Creek catchment. Given the extent of the resources to be retained in the Study Area and beyond, it is not considered that the Proposal would affect these species such that there would be an impact on their long term survival.

*(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."*

No critical habitat would be adversely affected by the draft Proposal. The Study Area is not listed as critical habitat under Part 3 Division 1 of the TSC Act.



*(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."*

No Recovery Plans or Threat Abatement Plans (either finalised or draft) have been prepared for the Eastern Bentwing-bat, Eastern False Pipistrelle or Eastern Freetail-bat. However, DECCW has identified a number of priority actions for these species (DECCW 2009b).

Of these, the following may be relevant:

- Retain stands of native vegetation (Medium Priority).

The recommendation of this report to minimise the impacts of the cycleway construction is consistent with the objectives of the priority actions.

*(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."*

Currently 27 Key threatening processes are defined under Schedule 3 of the TSC Act. The Proposal would include the clearing of an area of native vegetation (<1ha); this being listed as a Key Threatening Process.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

It is recommended that the largest possible area of bushland within the Study Area remains undisturbed to minimise the impact of key threatening processes.

#### **Expected impact on Microchiropteran Bats**

Potential foraging and roosting habitat for these bat species occurs along the length of the cycleway. There are trees with fibrous or stringy bark present, as well as many trees with scars and/or small hollows which may serve as potential roosting habitat for the Eastern Freetail-bat.

The cycleway construction will impact on less than 1 ha of native vegetation with the remainder of the surrounding bushland remaining unaffected. Considering the potential available within the Locality, the cycleway construction is not considered to have a significant impact on the local status of the three (3) threatened microchiropteran bats.

**It is not considered that the proposed construction of a cycleway between Linksley Avenue and Rosebery Road would have a significant impact on the Eastern Bentwing-bat, Eastern False Pipistrelle or Eastern Freetail-bat, their populations or habitats. Therefore, the preparation of a Species Impact Statement that further considers the impacts of the Cycleway Link on these species is NOT REQUIRED.**



### Grey-headed Flying Fox

The **Grey-headed Flying-fox** (*Pteropus poliocephalus*), is listed as ‘Vulnerable’ under Schedule 2 of the NSW *TSC Act 1995* and the Commonwealth *EPBC Act 1999*. Although no Grey-headed Flying-foxes were recorded within the Study Area, it is possible that this species would utilise the resources of the Study Area when local eucalyptus trees are in flower; this being a primary food source for this species. The Grey-headed Flying-fox has previously been recorded less than 1km from the Study Area.

(a) *“...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction...”*

The cycleway construction is expected to impact on less than 1 ha of native vegetation. Numerous canopy trees occur throughout the Study Area; these trees are likely to be utilised by the Grey-headed Flying fox as food when the dominant eucalypts are in flower. It is expected that the construction of the cycleway will only remove understory vegetation and small trees.

The Proposal would thus not significantly reduce the extent of any Grey-headed Flying-fox foraging or sheltering opportunities, nor would it result in the erection of any barriers to the dispersal, foraging or interbreeding needs of this species. As such, the viability of the local Grey-headed Flying-fox population would not be adversely affected thereby resulting in the local extinction of this species.

(b) *“...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction...”*,

An ‘endangered population’ is defined as a “population specified in Part 2 of Schedule 1” of the *TSC Act*. Therefore the Grey-headed Flying-fox is not an endangered population.

(c) *“...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction...”*

An Endangered Ecological Community means an ecological community specified in Part 3 of Schedule 1 of the *TSC Act*. The Grey-headed Flying-fox is not listed as an Endangered Ecological Community.

(d) *“...in relation to the habitat of a threatened species, population or ecological community:*

- (i) *the extent to which habitat is likely to be removed or modified as a result of the action proposed...”, and*



The vegetation likely to be removed or impacted within the Study Area (<1ha) may offer some foraging opportunities for the Grey-headed Flying-fox when the local eucalypts are flower. Whilst this is the case, the vegetation within the Study Area is part of the larger Cattai Creek riparian vegetation. Other areas of foraging habitat may also be found in local parks and reserves, in private gardens and streetscapes. The removal of less than 1 ha of foraging habitat within the Study Area is not considered to be significant in the context of the Locality and Region.

*(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and*

The Grey-headed Flying-fox is known to easily negotiate urban infrastructure, including urban areas, roads, open fields, water bodies and paddocks. When eucalyptus trees are flowering, the Flying-fox is known to traverse long distances in search of food. The disruption of less than 1 ha of native vegetation within the Study Area would not present a barrier to the movement patterns of this species such that any of its habitat areas are likely to become isolated.

*(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."*

The vegetation proposed to be impacted (<1 ha) would not be important for the long-term survival of the Grey-headed Flying-fox. Adjacent to the Study Area, in parks and reserves, in local properties, in the nearby western creekline and gully, and throughout the Locality and Region, numerous stands of similar trees are present, these providing foraging opportunities for this species, thereby guaranteeing the long-term presence of the Grey-headed Flying-fox.

*(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."*

No critical habitat would be adversely affected by the Proposal. The Study Area and Locality are not listed as critical habitat under Part 3, Division 1 of the *TSC Act*. Critical habitat for the Grey-headed Flying-fox is yet to be defined.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

A Draft National Recovery Plan has been prepared for the Grey-headed Flying-fox (DECCW 2009).

The following objective is relevant to this Proposal: to identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range. However, given the very small amount of habitat likely to be disturbed by the cycleway construction (<1ha), it is highly unlikely that this stand of vegetation would be identified as a priority foraging area.

*(g) ..whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*



Currently 27 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the TSC Act. Of these, "clearing of native vegetation" would be applicable to the Proposal. Whilst it is acknowledged that the cycleway construction would impact less than 1 ha of native bushland, it is not considered that this impact, would result in a significant loss of habitat for this species from the Locality or Region.

The effects of other key threatening processes such as the introduction and spread of weeds such as Lantana, exotic vines, perennial grasses, vines and scramblers should be kept to a minimum.

It is recommended that the largest possible area of bushland within the Study Area remains undisturbed to minimise the impact of key threatening processes.

#### **Expected impact on the Grey-headed Flying-fox**

The cycleway construction is not considered to have a significant impact on the local status of the Grey-headed Flying-fox. The works would not remove any significant portions of this species' roosting or breeding sites and no *major* foraging areas would be significantly affected. The works would not present a barrier to the dispersing or movement patterns of this species, the Grey-headed Flying-fox expected to easily negotiate those environments present within the Study Area and Locality generally.

**It is not considered that the proposed construction of a cycleway between Linksley Avenue and Rosebery Road would have a significant impact on the Grey-headed Flying-fox, its populations or habitats. Therefore, the preparation of a Species Impact Statement that further considers the impacts of the Cycleway Link on these species is NOT REQUIRED.**



## Appendix E: Aboriginal Sites Register Records



### AHIMS Web Services (AWS) Extensive search - Site list report

Your Ref Number : CattaiCkREF

Client Service ID : 7B985

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-5-2497	RH/CC2	AGD	56	312800	6268200	Open site	Valid	Artefact :-, Grinding Groove :-	Axe Grinding Groove,Open Camp Site	
<b>Contact</b>										
45-5-0134	Castle Hill Creek;Glenhaven;	AGD	56	314023	6268198	Closed site	Valid	Grinding Groove :-, Artefact :-	Axe Grinding Groove,Shelter with Deposit	
<b>Contact</b>										
45-5-2605	RH/CC2	AGD	56	312800	6268200	Open site	Valid	Grinding Groove :-		97421
<b>Contact</b>										
45-5-2608	RHOC 1	AGD	56	312800	6268200	Open site	Valid	Aboriginal Resource and Gathering :-		97421
<b>Contact</b>										
45-5-2879	WR01	AGD	56	313182	6267731	Open site	Valid	Artefact :-, Potential Archaeological Deposit (PAD) :-		
<b>Contact</b>										
		Recorders	Doctor,Jo McDonald					<b>Permits</b>		
		Recorders	Mr,R Taplin					<b>Permits</b>		
		Recorders	Doctor,Jo McDonald					<b>Permits</b>		
		Recorders	Doctor,Jo McDonald					<b>Permits</b>		
		Recorders	AECOM Australia Pty Ltd (previously HLA-Envirosciences)					Permits	1761	

Report generated by AHIMS Web Service on 03/09/2012 for Rebecca Carman for the following area at Lat, Long From : 150.9767, -33.71682 - Lat, Long To : -33.70101, 151.00308 with a Buffer of 50 meters. Additional Info : Information will be used in a Review of Environmental Factors. Number of Aboriginal sites and Aboriginal objects found is 5  
This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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